

## VPDES PERMIT FACT SHEET

This document gives the pertinent information concerning the **reissuance** of the VPDES permit listed below. This permit is being processed as a **minor municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq. The discharge results from the operation of a 0.0019 MGD intermittent sand filter system. This permit action consists of revising the monitoring frequencies for *E. coli*, BOD<sub>5</sub>, and TSS; adding an annual TSS loading limit; and revising the special conditions. (SIC Code: 4952)

1. **Facility Name and Address:**  
***Callaway Elementary School WWTP***  
250 School Service Road  
Rocky Mount, VA 24151  
Location: 8451 Callaway Road, Callaway, Virginia 24067
  2. **Permit No:** VA0088561      Existing Permit Expiration Date: September 8, 2015
  3. **Owner Contact:** Darryl Spencer, Supervisor of Buildings and Grounds, (540) 483-5538,  
darryl.spencer@frco.k12.va.us
  4. **Application Complete Date:** December 3, 2014  
**Permit Drafted By:** Becky L. France, Water Permit Writer  
Date: April 24, 2015 (Revised 6/3/15)  
DEQ Regional Office: Blue Ridge Regional Office  
Reviewed By: Kevin A. Harlow, Water Permit Writer  
Date Reviewed: June 1, 2015  
Public Comment Period Dates: From 5/16/15 To 6/15/15
  5. **Receiving Stream Classification:**  
Receiving Stream: Blackwater River, South Fork (River Mile: 2.35)  
Watershed ID: VAW-L08R (Upper Blackwater River Watershed)  
River Basin: Roanoke River  
River Subbasin: Roanoke River  
Section: 6a  
Class: V  
Special Standards: NEW-1  
7-Day, 10-Year Low Flow: 1.57 MGD      7-Day, 10-Year High Flow: 6.63 MGD  
1-Day, 10-Year Low Flow: 1.33 MGD      1-Day, 10-Year High Flow: 5.48 MGD  
30-Day, 10-Year Low Flow: 2.55 MGD      30-Day, 10 Year High Flow: 2.55 MGD  
30-Day, 5-Year Low Flow: 3.64 MGD      Harmonic Mean Flow: 11.2 MGD  
Tidal: No      303(d) Listed: Yes
- Attachment A** contains a copy of the flow frequency determination memorandum.
6. **Operator License Requirements:** None

7. **Reliability Class: II**8. **Permit Characterization:**

- ☐ Private      ☐ Interim Limits in Other Document  
☐ Federal      ☐ Possible Interstate Effect  
☐ State  
☒ POTW  
☐ PVOTW

9. **Wastewater Treatment System:** A description of the wastewater treatment system is provided below. See **Attachment B** for the wastewater treatment schematic and **Attachment C** for a copy of the site inspection report. Treatment units associated with the discharge are listed in the table below.

**Table I**  
**DISCHARGE DESCRIPTION**

<b>Outfall Number</b>	<b>Discharge Source</b>	<b>Treatment (Unit by Unit)</b>	<b>Flow (Design) (MGD)</b>
001	Callaway Elementary School WWTP	grease trap pump station septic tanks (2) dosing chamber distribution box sand filters (3) tablet chlorinator chlorine contact tank tablet dechlorinator	0.0019

A 1,900 gallon sand filter system treats domestic wastewater from Callaway Elementary School. Wastewater from the school (including cafeteria) flows through a grease trap and is then pumped to two septic tanks. Supernatant from the septic tanks flows by way of a 754-gallon dosing chamber to a distribution box and then to two of the three sand filters. The gates from the distribution box are manually moved periodically to rotate the flow between the three sand filters. Underflow from the sand filters is routed through a tablet chlorinator with chlorine contact tank and then through a tablet dechlorinator prior to discharge to the South Fork of the Blackwater River.

10. **Sewage Sludge Use or Disposal:** This facility collects septage in a septic tank. This septage is hauled to a POTW as needed.

11. **Discharge Location Description:** A USGS topographic map which indicates the discharge location, any significant dischargers, any water intakes, and other items of interest is included in **Attachment D**. The latitude and longitude of the discharge is N 37°00'39", E 80°02'53".

Name of Topo: Callaway Number: 080D

12. **Material Storage:** Calcium hypochlorite tablets and sodium sulfite tablets are stored outside in watertight containers.
13. **Ambient Water Quality Information:** Flow frequencies for the receiving stream, receiving stream classification, and 303(d) listing information are discussed below.

#### Flow Frequencies

Flow frequencies were determined from stream measurements taken upstream from the outfall. Reference gauge data upstream from the discharge point were plotted on a regression line and the associated flow frequencies above the discharge point were determined from the graph. Since the previous permit, there has been a slight increase in the flow frequencies. **Attachment A** contains a copy of the flow frequency determination memorandum which describes flow calculations.

#### Receiving Stream Water Quality Data

Data for STORET Station 4AGCR000.01 were collected upstream of the outfall on the South Fork of the Blackwater River at the Route 739 bridge in the Franklin County community of Algoma. The 90<sup>th</sup> percentile temperature and pH and average hardness used in the antidegradation wasteload allocation spreadsheet were determined from these STORET station data.

#### Water Use Classification

The Callaway Elementary WWTP discharges into the Upper Blackwater River Watershed. This segment of the South Fork of the Blackwater River is listed in the 2012 303(d) report as impaired for bacteria and temperature. The bacterial impairment on the Blackwater River begins at the Route 739 bridge in Algoma and ends just west of the Route 641 bridge where the North and South Forks of the Blackwater River join. Agricultural nonpoint source runoff from dairy operations along the stream is listed as the source of the bacterial impairment. A fecal coliform TMDL for the Blackwater River was approved by the EPA on February 2, 2001 and the State Water Control Board on June 17, 2004. The report contains a wasteload allocation (WLA) for this discharge of (2.80E+09 cfu/year) for fecal coliform. The TMDL report indicates that a fecal coliform limit of 200 cfu/100 mL (which is less stringent than the 126 cfu/100 mL *E. coli* limit) will ensure compliance with the bacteria TMDL for the discharge. So the bacteria limit is in compliance with the TMDL wasteload allocation. No temperature limit has been assigned to this discharge because it is not believed that the discharge will contribute to temperature exceedances in the receiving stream.

A benthic TMDL for the Upper Blackwater River Watershed was approved by the EPA on April 26, 2004 and the State Water Control Board on August 31, 2004. The impaired segment of the stream is located downstream from the discharge point for Callaway Elementary School WWTP. Since Callaway Elementary School WWTP is in the watershed, an allocation for TSS was included.

14. **Antidegradation Review and Comments:** Tier 1 \_\_\_\_\_ Tier 2   X   Tier 3 \_\_\_\_\_

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. The South Fork of the Blackwater River is not listed as a public water supply in the segment where the discharge is located. This segment (VAW-HO8R) is listed on Part I of the 303(d) list for exceedances of the bacteria and temperature water quality criteria. In accordance with Guidance Memo 00-2011, bacteria should not be used to determine tier unless there is clear and convincing evidence that the elevated bacteria numbers are due to inadequately disinfected human waste. This Guidance Memo also notes that periodic violation of the maximum temperature standard for Class V waters during the summer period is not necessarily a reason to classify a stream as Tier 1. Class V are stocked with trout and occasional exceedances of the temperature criteria can be expected but does not normally impact the use of the stream since it is not expected to support a permanent trout fishery. Excluding fecal coliform and temperature, there is no evidence that the receiving stream does not meet or exceed water quality standards. Therefore, this segment of the South Fork of the Blackwater River is classified as a Tier 2 water, and no significant degradation of existing quality is allowed.

For purposes of aquatic life protection in Tier 2 waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated. The antidegradation baselines for aquatic life and human health are calculated for each pollutant as follows:

**Antidegradation baseline (aquatic life) = 0.25 (WQS – existing quality) + existing quality**

**Antidegradation baseline (human health) = 0.10 (WQS – existing quality) + existing quality**

Where:

“WQS” = Numeric criterion listed in 9 VAC 25-260-00 et seq. for the parameter analyzed

“Existing quality” = Concentration of the parameter being analyzed in the receiving stream

When applied, these “antidegradation baselines” become the new water quality criteria in Tier 2 waters. Antidegradation baselines have been calculated as described above and included in **Attachment F**.

The Callaway Elementary School WWTP was built in 1963 prior to the antidegradation policy requirements set forth in the Clean Water Act. The antidegradation requirements apply to existing uses attained after November 28, 1975. Therefore, antidegradation baselines only apply if the facility has expanded or significantly increased the discharge. The facility's outfall 001 discharge is existing, and the application does not indicate an expansion or proposed increase in the discharge of pollutants via this outfall. Therefore, the antidegradation baselines do not apply to this permit reissuance. As the facility is not proposing any increase in the loading of any pollutants, the permit limits are in compliance with antidegradation requirements set forth in 9 VAC 25-260-30.

15. **Site Inspection:** Date: April 2, 2015 Performed by: Becky L. France  
**Attachment C** contains a copy of the site inspection memorandum. The last compliance inspection was performed on September 12, 2012 by Ryan Hendrix.
16. **Effluent Screening and Limitation Development:** DEQ Guidance Memo 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq.). Refer to **Attachment F** for the antidegradation wasteload allocation spreadsheet and effluent limit calculations. See **Table II** on page 15 for a summary of limits and monitoring requirements.

A. **Mixing Zone**

Effluent is discharged into the South Fork of the Blackwater River. The Agency mixing zone program, MIXER, was run to determine the percentage of the receiving stream flow that can be used in the antidegradation wasteload allocation calculations. The program indicated that 100 percent of the 1Q10 and 7Q10 may be used for calculating the acute and chronic wasteload allocations (WLAs). A copy of the printout from the MIXER run is included in **Attachment F**.

B. **Effluent Limitations for Conventional Pollutants**

**Flow** -- The permitted design flow of 0.0019 MGD for this facility is taken from the previous permit and the application for the reissuance. In accordance with the VPDES Permit Manual, flow is to be estimated and reported per discharge day.

**pH** -- Between November 2011 and January 2015 there were no exceedances of the pH limits. The pH limits of 6.0 S.U. minimum and 9.0 S.U. maximum have been continued

from the previous permit. These limits are based upon the water quality criteria in 9 VAC 25-260-50 for Class V receiving waters and are in accordance with federal technology-based guidelines, 40 CFR Part 133, for secondary treatment. Grab samples shall continue to be collected. The monitoring data for pH were more than 0.5 S.U. from the limitations so the monitoring frequency has been reduced from 1/discharge-day to 1/ discharge-week. See **Attachment H** for a summary of discharge data and a discussion of reduced monitoring.

**Total Suspended Solids (TSS)** – Between November 2011 and January 2015 there were no exceedances of the TSS limits. TSS limits of 30 mg/L (210 g/d) for monthly average and 45 mg/L (320 g/d) weekly average are based upon technology-based requirements for municipal dischargers with secondary treatment required in accordance with 40 CFR Part 133 and have been continued from the previous permit. Grab samples shall continue to be collected. The monitoring data for TSS were significantly below the limitations so the monitoring frequency has been reduced from 1/month to 1/6 months. See **Attachment H** for a summary of discharge data and a discussion of reduced monitoring.

A benthic TMDL for the Upper Blackwater River Watershed was approved by the EPA on April 26, 2004 and the State Water Control Board on August 31, 2004. The impaired segment of the stream is located downstream from the discharge point for Callaway Elementary School WWTP. Since Callaway Elementary School WWTP is in the watershed, an allocation for TSS was included. The permit includes a TSS annual loading limit of 78.9 kg which is the total maximum daily load (TMDL) allocation from the report *Benthic TMDL Development for the Upper Blackwater River Watershed* (**Attachment E**). See Part I.C.11 for formulas used to calculate the total annual TSS loading.

**Biochemical Oxygen Demand (BOD<sub>5</sub>)** – In a previous reissuance the regional dissolved oxygen model program was run based on a revised 7Q10 flow of 1.294 MGD and a 90th percentile water temperature of 23.3 °C. A revised 7Q10 of 1.33 MGD and temperature of 21.5 °C were input into the water quality model to see if water quality based limits are needed. The effluent characteristic input values used were a BOD<sub>5</sub> of 30 mg/L, total kjeldahl nitrogen (TKN) of 20 mg/L, and dissolved oxygen (DO) of 0 mg/L, as conservative effluent values. The model predicted little impact on the instream DO levels by the discharge, with values well above the water quality criterion for DO of 5.0 mg/L, within the 0.26 mile modeled segment. So, more stringent water quality based BOD<sub>5</sub> limits or DO limits are not needed. Refer to **Attachment G** for a copy of the model printout.

In September 2011 there was an exceedance of the BOD<sub>5</sub> limit (73.2 mg/L). The permittee discovered undissolved sodium sulfite from the dechlorination tablets floating in the sample and attributed the high BOD<sub>5</sub> to the oxygen scavenging properties of the sodium sulfite. This problem was not noted in the last three years of the permit term. Between November 2011 and January 2015 there were no exceedances of the BOD<sub>5</sub> limits. The BOD<sub>5</sub> limits of 30 mg/L monthly average (210 g/day) and 45 mg/L

(320 g/day) weekly average have been continued from the previous permit. These limits are technology-based requirements for dischargers with secondary treatment required in accordance with 40 CFR Part 133. Grab samples shall continue to be collected. All monitoring data for BOD<sub>5</sub> during the last three years of the permit were significantly below the limitations so the monitoring frequency has been reduced from 1/month to 1/3 months. See **Attachment H** for a summary of discharge data and a discussion of reduced monitoring.

**Oil and Grease** -- During the permit term one of the data points significantly exceeded the oil and grease limit of 15 mg/L (**Attachment H**). The technology-based limit of 15 mg/L weekly average has been continued from the previous permit. Oil and grease shall continue to be monitored once per discharge month via grab samples.

**Total Phosphorus, Total Nitrogen** -- In accordance with the revised Water Quality Standards (9 VAC 25-260-00 et seq.) adopted by the Board in December 1997, this discharge is into a stream segment that has been classified as nutrient enriched. The receiving stream is a tributary to the Roanoke River and thus, Smith Mountain Lake. The Policy on Nutrient Enriched Water (9 VAC 25-40-10 et seq.) requires effluent limitations on total phosphorus for all discharges permitted after July 1, 1988, with a flow greater than 0.05 MGD. Callaway Elementary School WWTP has a design flow of 0.0019 MGD, so no permit limitations have been imposed.

The Nutrient Enriched Policy also allows for the implementation of monitoring requirements if it has been determined that there is the potential to discharge a monthly average total phosphorus concentration greater than or equal to 2 mg/L or monthly average total nitrogen concentration greater than or equal to 10 mg/L. In 2005 through 2009, permittee has collected total phosphorus and total nitrogen effluent data. A summary of the nutrient data is included in **Attachment F**. No additional nutrient monitoring will be required with this reissuance. A Nutrient Enriched Reopener Special Condition (Part I.C.7) has been included in the permit to allow the permit to be reopened if new nutrient criteria are developed.

C. Effluent Limitations for Toxic Pollutants

**Ammonia as N** -- The need for an ammonia limit has been reevaluated using revised water quality criteria and flows. The acute water quality criteria and wasteload allocations were calculated and are included in the spreadsheet in **Attachment F**. Since the facility discharges intermittently, only the acute wasteload allocation was input into the Agency's STATS program to determine if a limit is needed. As recommended in Guidance Memo 00-2011, a default ammonia concentration of 9 mg/L was input into the program. The program output indicates that a permit limit is not necessary for ammonia (**Attachment F**).

**E. coli** -- A bacteria TMDL for the South Fork of the Blackwater River watershed allocates a fecal coliform wasteload allocation (2.80E+09 cfu/year) that is derived from a

bacteria water quality criterion of 200 cfu/100 for fecal coliform. This allocation was derived by multiplying the design flow (0.0019 MGD) by the bacteria water quality standards (200 cfu/100 mL) for fecal coliform. The TMDL report indicates that a fecal coliform limit of 200 cfu/100 mL will ensure compliance with the bacteria TMDL for the discharge. Refer to **Attachment E** for information from the bacteria TMDL report. The VPDES Permit Manual recommends that bacteria limits be given as *E. coli*. In accordance with the VPDES Permit Manual, a monthly geometric average limit of 126 cfu/100 mL for *E. coli* has been added to the permit. This limit is expected to be protective of the TMDL which is based upon fecal coliform. During the permit term, the highest *E. coli* value was 7.9 cfu/100 mL. See **Attachment F** for a summary of *E. coli* data collected during the permit term. Since these data were significantly below the water quality criterion, the monitoring frequency for the grab samples shall be reduced from 1/D-Week to 1/Year. In order to calculate a geometric mean a total of four consecutive weekly samples are required.

**Total Residual Chlorine (TRC)** -- As noted in Guidance Memo 00-2011, all chlorinated effluent must have a chlorine limit because there is a reasonable potential for the facility to cause or contribute to a violation of the standards. This Guidance Memo also recommends an upper, technology based wasteload allocation of 4.0 mg/L where the chlorine limit, based solely on dilution, would be excessive. The effluent limits are technology based limits. The previous permit limits of 2.0 mg/L monthly average and 2.4 mg/L weekly average have been continued. The limits were calculated by entering an acute WLA of 4.0 mg/L into the STATS program. The program used 4.0 mg/L wasteload allocations as the 97<sup>th</sup> percentile distribution that must be attained. Monitoring shall be continued once per discharge day using grab samples. Refer to **Attachment F** for a copy of the STATS program output.

17. **Basis for Sludge Use and Disposal Requirements:** Since the facility proposes to pump and haul septage to a POTW, there are no sludge limits or monitoring requirements.
18. **Antibacksliding Statement:** Since there are no limitations less stringent than the previous permit, the permit limits comply with the antibacksliding requirements of 9 VAC 25-31-220 L of the VPDES Permit Regulation.
19. **Compliance Schedules:** There are no compliance schedules included in this permit.
20. **Special Conditions:** A brief rationale for each special condition contained in the permit is given below.
  - A. **Additional Total Residual Chlorine (TRC) Limitations and Monitoring Requirements (Part I.B)**

**Rationale:** This condition is required by the Sewage Collection and Treatment Regulations, 9 VAC 25-790. The permittee monitors the TRC concentration after chlorine contact. In accordance with 40 CFR 122.41(e), permittees are required, at all

times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. These requirements ensure proper operation of chlorination equipment to maintain adequate disinfection.

**B. 95% Capacity Reopener (Part I.C.1)**

Rationale: This condition requires that the permittee address problems resulting from high influent flows, in a timely fashion, to avoid non-compliance and water quality problems from plant overloading. In accordance with 9 VAC 25-31-200 B4 of the VPDES Permit Regulation, this requirement is required for all POTW and PVOTW permits.

**C. CTC, CTO Requirement (Part I.C.2)**

Rationale: This condition is required by Code of Virginia § 62.1-44.19 and the Sewage Collection and Treatment Regulations, 9 VAC 25-790.

**D. Operation and Maintenance Manual Requirement (Part I.C.3)**

Rationale: An Operations and Maintenance Manual is required by the Code of Virginia § 62.1-44.19, Sewage Collection and Treatment Regulations, 9 VAC 25-790, and the 9 VAC 25-31-190E of the VPDES Permit Regulation.

**E. Reliability Class (Part I.C.4)**

Rationale: Reliability class designations are required by Sewage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities. Facilities are required to achieve a certain level of reliability to protect water quality and public health in the event of component or system failure. A Reliability Class II has been assigned to this facility.

**F. Closure Plan (Part I.C.5)**

Rationale: This condition establishes the requirement to submit a closure plan for the treatment works if the treatment facility is being replaced or expected to close. A closure plan is necessary to ensure treatment works are properly closed so that the risk of untreated wastewater discharge, spills, leaks, and exposure to raw materials is eliminated and water quality is maintained. The Code of Virginia § 62.1-44.21 requires every owner to furnish when requested plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from this discharge on the quality of state waters, or such other information as may be necessary to accomplish the purpose of the State Water Control Law.

**G. Sludge Reopener (Part I.C.6)**

Rationale: This condition is required by VPDES Permit Regulation, 9 VAC 25-31-220 C for all permits issued to treatment works treating domestic sewage to allow incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the Clean Water Act.

**H. Nutrient Enriched Waters Reopener (Part I.C.7)**

Rationale: The Regulation for Nutrient Enriched Waters and Dischargers within, 9 VAC 25-40-10 et seq. allows reopening of permits for discharges into waters designed as nutrient enriched if total phosphorus or total nitrogen in a discharge potentially exceed specified concentrations. The policy anticipates that future nutrient limits may be needed to control aquatic plants.

**I. Compliance Reporting (Part I.C.8)**

Rationale: In accordance with VPDES Permit Regulation, 9 VAC 25-31-190 J4 and 220 I, this condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. This condition also establishes protocols for calculation of reported values.

**J. Total Maximum Daily Load (TMDL) Reopener (Part I.C.9)**

Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

**K. Effluent Monitoring Frequencies (Part I.C.10)**

Rationale: Permittees are granted a reduction in monitoring frequency based on a history of permit compliance. To remain eligible for the reduction, the permittee should not have violations related to the effluent limits for which reduced frequencies were granted. If the permittee fails to maintain the previous level of performance, the baseline monitoring frequency should be reinstated for those parameters that were previously granted a monitoring frequency reduction.

**L. Total Suspended Solids Load Calculations (Part I.C.11)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 J4 and 220 I authorizes the establishment of procedures to compile and analyze data. This special condition has been added to provide formulas for calculating the annual loading for total suspended solids (TSS). The calculation of an annual TSS loading is needed to demonstrate compliance with the TSS total maximum daily load (TMDL) allocation assigned to this discharge.

**M. Permit Application Requirement (Part I.C.12)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100.D and 40 CFR 122.21(d)(1) require submission of a new application at least 180 days prior to expiration of the existing permit. In addition, the VPDES Permit Regulation, 9 VAC 25-31-100 E.1 and 40 CFR 122.21 (e)(1) note that a permit shall not be issued before receiving a complete application.

**N. Conditions Applicable to All VPDES Permits (Part II)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

**21. Changes to the Permit:****A. Special conditions that have been modified from the previous permit are listed below: (The referenced permit sections are for the new permit.)**

1. The Additional Total Residual Chlorine (TRC) Limitations and Monitoring Requirements Special Condition (Part I.B) has been revised in accordance with the VPDES Permit Manual.
2. The Operations and Maintenance Manual Special Condition (Part I.C.3) has been revised in accordance with the VPDES Permit Manual.
3. The Compliance Reporting Special Condition (Part I.C.8) has been revised to include additional quantification level (QL) information.

**B. New special condition that have been added to the permit are listed below:**

1. An Effluent Monitoring Frequencies Special Condition (Part I.C.10) has been added to revert the reduced monitoring parameters to the baseline monitoring frequency if a warning letter is issued.
2. A Total Suspended Solids Load Calculation Special Condition (Part I.C.11) has been added to provide formulas to calculate the annual total suspended solids TMDL loading.

3. A Permit Application Requirement Special Condition (Part I.C.12) has been added to provide the specific due date for the required submittal of the application.

C. **Permit Limits and Monitoring Requirements:** See **Table III** on page 16 for details on changes to the effluent limits and monitoring requirements.

22. **Variances/Alternate Limits or Conditions:** No variances or alternate limits or conditions are included in this permit. A waiver was requested to allow that grab samples for TSS and BOD<sub>5</sub> required by the permit, be recorded on the application in lieu of composite samples. This waiver has been granted.
23. **Regulation of Treatment Works Users:** VPDES Permit Regulation 9 VAC 25-31-280 B9 requires that every permit issued to a treatment works owned by a person other than a state or municipality provide an explanation of the Board's decision on the regulation of users. There are no industrial users contributing to the treatment works.
24. **Public Notice Information required by 9 VAC 25-31-280 B:**

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Becky L. France at:

Virginia DEQ, Blue Ridge Regional Office  
3019 Peters Creek Road  
Roanoke, VA 24019  
540-562-6700  
[becky.france.deq.virginia.gov](mailto:becky.france.deq.virginia.gov)

Persons may comment in writing or by e-mail to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for the comments. Only those comments received within this period will be considered.

The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may review the draft permit and application at the Blue Ridge Regional Office in Roanoke by appointment. A copy of the public notice is found in **Attachment I**.

25. **303(d) Listed Segments (TMDL):** This facility discharges directly to the South Fork of the Blackwater River. The stream segment receiving the effluent is listed as impaired for fecal coliform and temperature on the current 303(d) list. EPA approved the fecal coliform TMDL on February 2, 2001. It contains a wasteload allocation (WLA) for this discharge of (2.80E+09 cfu/year) for fecal coliform. The TMDL report indicates that an *E. coli* limit of 126 cfu/100 mL which is more stringent than the 200 cfu/100 mL TMDL and will ensure compliance with the bacteria TMDL for the discharge. So the bacteria limit is in compliance with the TMDL wasteload allocation. No temperature limit has been assigned to this discharge because it is not believed that the discharge will contribute to temperature exceedances in the receiving stream.

A Benthic TMDL for the Upper Blackwater Watershed was approved by EPA on April 26, 2004 and the State Water Control Board on August 31, 2004. A segment of the Blackwater River below the discharge point beginning at the confluence of the North and South Forks of the Blackwater River to approximately 0.10 miles below Route 737 (Hickman Road) (5.62 miles in length). Additionally, the entire length of the North Fork of the Blackwater is listed as impaired. Sediment and total phosphorus are the pollutants of concern. The facility has been assigned a total suspended solids allocation of 78.9 kg, and this limit is included in the permit to comply with the TSS TMDL assigned with to this facility.

26. **Additional Comments:**

- A. **Reduced Effluent Monitoring:** In accordance with Guidance Memo 98-2005, all permit applications received after May 4, 1998, are considered for reduction in effluent monitoring frequency. Only facilities having exemplary operations that consistently meet permit requirements may qualify for reduced monitoring. To qualify for consideration of reduced monitoring requirements, the facility should not have been issued any Warning Letters or Notices of Violation (NOV), or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. The facility has not been issued any warning letters or NOVs within the past three years and therefore qualifies for a reduced monitoring evaluation. See **Attachment H** for a compilation of effluent data and a discussion of reduced monitoring.
- B. **Previous Board Action:** The facility was issued a Special Order by Consent June 16, 1997. The Consent Order required the installation of chlorination equipment. The requirement of the Consent order was met with the installation of chlorination and dechlorination equipment.
- C. **Staff Comments:** The discharge is in conformance with the existing TMDLs established for the area.

On June 3, 2015 information about the calculation of the Total Suspended Solids (TSS) Load Calculations Special Condition (Part I.C.11) was clarified to note that the calculations shall be reported annually and a discussion of the annual load limit for TSS was added to Section 16b of the Fact Sheet. Additional information about BOD<sub>5</sub>

monitoring data during the first part of the permit term was also added to Section 16b of the Fact Sheet.

D. **Public Comments:** No comments received during the public comment period.

E. **Tables:**

Table I	Discharge Description (Page 2)
Table II	Basis for Monitoring Requirements (Page 15)
Table III	Permit Processing Change Sheet (Page 16)

F. **Attachments:**

- A. Flow Frequency Memorandum
- B. Wastewater Schematic
- C. Site Inspection Report
- D. USGS Topographic Map
- E. Ambient Water Quality Information
  - STORET Data (Station 4-AGCR000.01)
  - 2012 Impaired Waters Summary Report (Excerpt)
  - Fecal Coliform TMDL Development for South Fork of the Blackwater River (Excerpt)
  - Benthic TMDL Development for the Upper Blackwater River Watershed (Excerpt)
- F. Wasteload and Limit Calculations
  - Mixing Zone Calculations (MIXER 2.1)
  - Effluent Data (pH, N, P, *E. coli*)
  - Antidegradation Wasteload Allocation Spreadsheet
  - STATS Program Outputs (ammonia, TRC)
- G. Regional Water Quality Model Output
- H. Reduced Monitoring Evaluation Memorandum
- I. Public Notice

**Table II**  
BASIS FOR LIMITATIONS – MUNICIPAL

( ) Interim Limitations  
(x) Final Limitations

OUTFALL: 001  
DESIGN CAPACITY: 0.0019 MGD

Effective Dates - From: Effective Date  
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	1/D-Day	Estimate
pH (Standard Units)	1,2	NA	NA	6.0	9.0	1/D-Week	Grab
BOD <sub>5</sub>	1	30 mg/L 210 g/d	45 mg/L 320 g/d	NA	NA	1/Quarter	Grab
<i>E. coli</i>	2,4	126 cfu/100 mL	NA	NA	NA	1/Year*	Grab (between 8 AM and 4 PM)
Total Suspended Solids	1	30 mg/L 210 g/d	45 mg/L 320 g/d	NA	NA	1/6 Months	Grab
Total Suspended Solids (kg/calendar year)	5	NA	NA	NA	78.9 kg	1/Year	Calculated
Oil and Grease	3	NL mg/L	15 mg/L	NA	NA	1/D-Month	Grab
Total Residual Chlorine	3	2.0 mg/L	2.4 mg/L	NA	NA	1/D-Day	Grab

NA = Not Applicable  
NL = No Limitations; monitoring only

1/D-Day = once per day of discharge  
1/D-Month = once per discharge month

1/D-Week = once per discharge week  
\*collect 1 sample per week for 4 weeks

The basis for the limitations codes are:

1. Federal Technology-Based Secondary Treatment Regulation (40 CFR Part 133)
2. Water Quality Criteria
3. Best Professional Judgment
4. Bacteria TMDL Wasteload Allocation (South Fork of Blackwater River Watershed)
5. Benthic TMDL Wasteload Allocation (Upper Blackwater River Watershed)

**Table III**  
**PERMIT PROCESSING CHANGE SHEET**

**LIMITS AND MONITORING SCHEDULE:**

Outfall No.	Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
		From	To	From	To		
001	pH	1/D-Day	1/D-Week			Based on the pH data, the facility qualifies for a reduction in monitoring frequency.	3/10/15
001	BOD <sub>5</sub>	1/Month	1/Quarter			Based on the BOD <sub>5</sub> data, the facility qualifies for a reduction in monitoring frequency.	3/10/15
001	Total Suspended Solids (TSS)	1/Month	1/6 Months			Based on the TSS data, the facility qualifies for a reduction in monitoring frequency.	3/10/15
001	Total Suspended Solids (kg/calendar year)	NA	1/Year	NA	78.9 kg maximum	Monitoring has been added to verify compliance with the TSS TMDL loading limit.	3/10/15
001	<i>E. coli</i>	1/D-Week	1/Year			The data collected during the permit term were significantly below the permit limit, so the monitoring frequency has been reduced to annual to verify compliance with the bacteria TMDL allocation.	3/10/15

## **Attachment A**

### **Flow Frequency Memorandum**


# MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
3019 Peters Creek Road Roanoke, Virginia 24017

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**SUBJECT:** Flow Frequency Determination  
Callaway Elementary School WWTP, VA0088561

**TO:** Permit File

**FROM:** Becky L. France, Water Permit Writer 

**DATE:** March 8, 2015

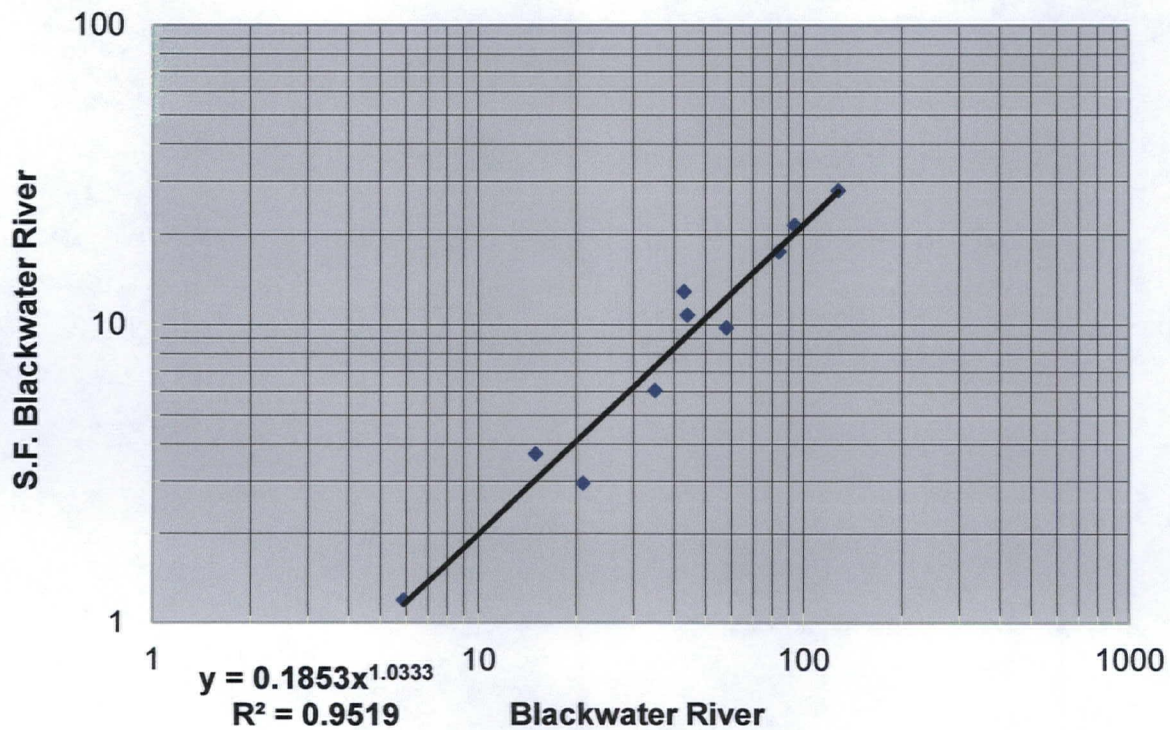
This memorandum supersedes the April 9, 2010 memo concerning the subject VPDES permit.

The Callaway Elementary School WWTP discharges to the South Fork of the Blackwater River near Callaway, Virginia. Stream flow frequencies are required at this site to develop effluent limitations for the VPDES permit.

The DEQ conducted several flow measurements on the South Fork of the Blackwater River from 1994 to 1999. The measurements were made above the Callaway Elementary School WWTP outfall. The measurements correlated very well with the same day daily mean values from the continuous record gauge on the Blackwater River at Rocky Mount, VA (#03056900). The measurements and daily mean values were plotted on a logarithmic graph and a best fit line was drawn through the data points. The required flow frequencies from the reference gauge were plugged into the equation for the regression line and the associated flow frequencies at the discharge point were calculated. A spreadsheet and graph of the flow values are attached. The high flow months are January through May. The data for the reference gauge and the discharge point are given in the attached tables.

Flow Data (cfs)

Date	Blackwater	S.F
11/9/1994	58	9.8
11/19/1996	128	28
5/22/1997	94	21.5
6/24/1997	84	17.6
9/17/1997	35	6.07
9/9/1998	21	2.96
5/25/1999	43	12.9
8/17/1999	5.9	1.2
5/8/2001	44	10.8
10/23/2001	15	3.71



Blackwater	Flow Freq	Above Outfall	
cfs		cfs	MGD
8.84	1Q10	2.052	1.326
10.3	7Q10	2.429	1.570
22.1	30Q5	5.639	3.644
32	HF 1Q10	8.483	5.482
38	HF 7Q10	10.254	6.627
61	HM	17.286	11.171
16	30Q10	3.948	2.552
51	HQ 30Q10	14.187	9.169
115.0 mi <sup>2</sup>	DA	22.17 mi <sup>2</sup>	

Low flow months Jan-May  
 DA = drainage area

Reference Gauge (data from 1972 to 2011)					
Blackwater River at Rocky Mount, VA (#02056900)					
Drainage Area [ mi <sup>2</sup> ] =			115 mi <sup>2</sup>		
	ft <sup>3</sup> /s	MGD		ft <sup>3</sup> /s	MGD
1Q10 =	8.84	6	High Flow 1Q10 =	32	21
7Q10 =	10.3	7	High Flow 7Q10 =	38	25
30Q5 =	22.1	14	High Flow 30Q10 =	51	33
30Q10 =	16	10	HM =	61	39

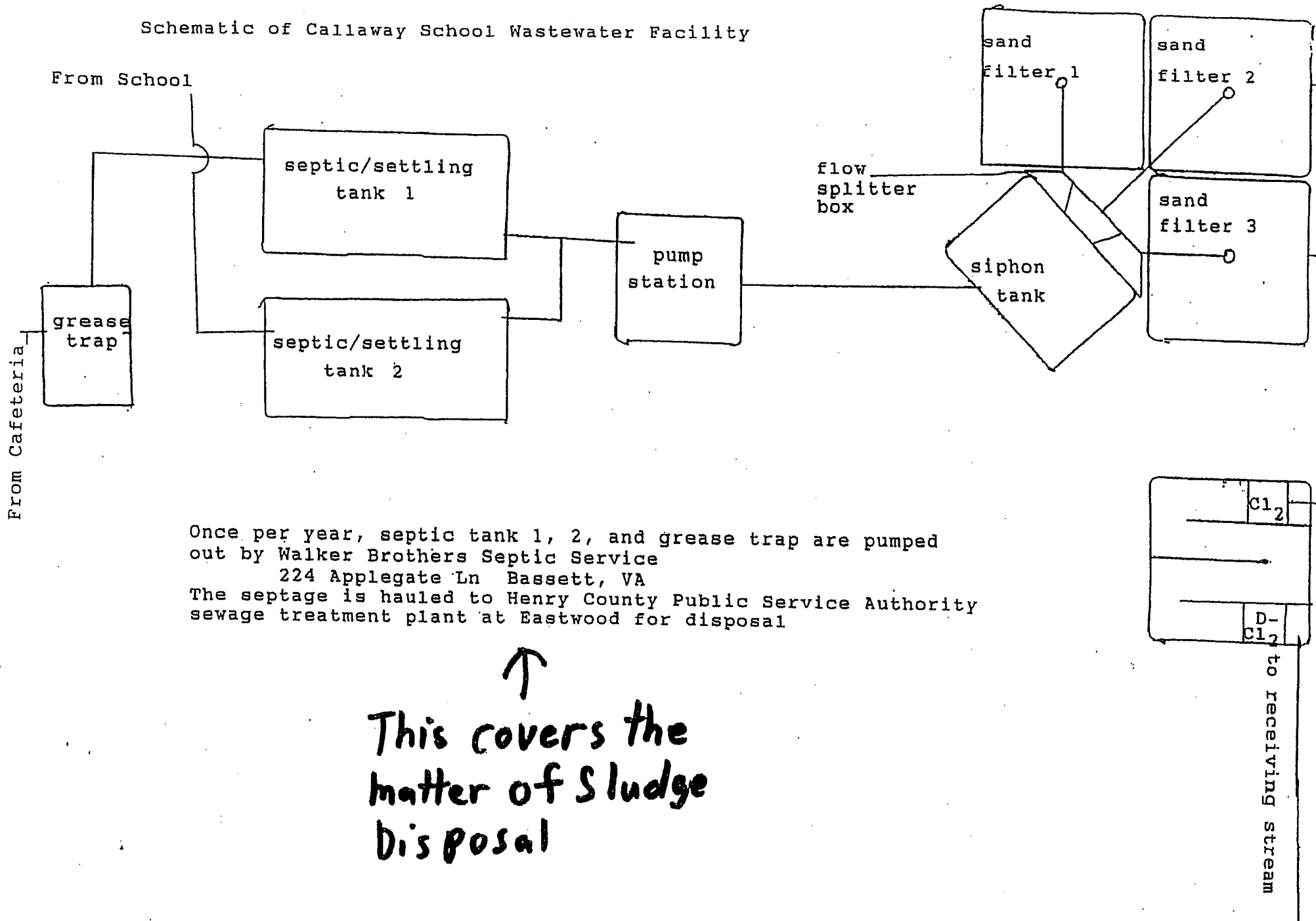
Flow frequencies for the 9/9/10 reissuance permit					
S.F. Blackwater River above Callaway School WWTP(#02056800)					
Drainage Area [ mi <sup>2</sup> ] =			22.17 mi <sup>2</sup>		
	ft <sup>3</sup> /s	MGD		ft <sup>3</sup> /s	MGD
1Q10 =	2.05	1.33	High Flow 1Q10 =	8.48	5.48
7Q10 =	2.43	1.57	High Flow 7Q10 =	10.25	6.63
30Q5 =	5.64	3.64	High Flow 30Q10	14.19	2.55
30Q10 =	3.95	2.55	HM =	17.29	11.17

SITEID	NAME	RECORD	River	LATLONG	DAAREA	HARMEAN	HF30Q10	HF7Q10	HF1Q10	Z30Q5	Z30Q10	Z7Q10	Z1Q10	Z1Q30	HFMTHS	Statperiod	Yrstrn
02056900	Blackwater River near Rocky Mount, Va.	R, 1977-	Roanoke River	Lat 37 02'43", Long 79 50'39", NAD 83	115.0	61	51	38	32	22.1	17	10.3	8.84	4.6	JAN-MAY	1977-2011	2012

**Attachment B**

**Wastewater Schematic**

# Schematic of Callaway School Wastewater Facility



**Attachment C**

**Site Inspection Report**

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY

*Blue Ridge Regional Office*

3019 Peters Creek Road

Roanoke, VA 24019

SUBJECT: Site Inspection Report for Callaway Elementary School WWTP  
Reissuance of VPDES Permit No. VA0088561

TO: Permit File

FROM: Becky L. France, Water Permit Writer *BLF*

DATE: April 9, 2015

On April 8, 2015, I conducted a site inspection of the wastewater works at Callaway Elementary School. Ruthie Hurd-Dooley, operator were present at the inspection. The school is located on State Route 641 (Callaway Road) in the community of Callaway. The treatment facility treats municipal sewage from Callaway Elementary School.

The 1,900 gpd wastewater treatment system consists of a grease trap, two septic tanks, pump station, dosing chamber, distribution box, three sand filters, tablet chlorinator, chlorine contact tank, and tablet dechlorinator. Wastewater from the school (including cafeteria) flows through a grease trap and is then pumped to two septic tanks. The grease trap and septic tanks are generally pumped once per year and transported to the POTW.

The wastewater from the septic tanks flows into a 753.98 gallon dosing tank. Once this tank reaches capacity, the wastewater automatically discharges to a distribution box. The distribution box consists of three gates that can be manually moved to control the flow to the sand filters. The gates are moved monthly to rotate the flow between the three sand filters. The flow enters the sand filters through an eight-inch pipe, and then dispersed onto the sand by a concrete pad. Each filter consists of a 36-inch deep layer of sand over a 12-inch base of gravel over tile. At the time of the site visit, two sand filters were in use and there was no ponding of wastewater on the filter. There was only a small amount of algae on the sand filter not being used.

Sand filter underflow is routed through a tablet chlorinator into the chlorine contact chamber for an hour detention time. One of the two tablet chlorinator tubes was in use at the time of the site visit. Tablets are stored in their original buckets on the grating of the contact tank. Chlorinated effluent then flows through a tablet dechlorinator and is discharged to the South Fork of the Blackwater River. Flow is estimated from a discharge weir on the end of the tablet dechlorinator. At the time of the site visit, there was no discharge or evidence of debris at the discharge point.

**Attachment D**

**USGS Topographic Map**



## **Attachment E**

### **Ambient Water Quality Information**

- **STORET Data (Station 4-AGCR000.01)**
- **2012 Impaired Waters Summary Report (Excerpt)**
- **Fecal Coliform TMDL Development for South Fork of the Blackwater River, Virginia (Excerpt)**
- **Benthic TMDL Development for the Upper Blackwater River Watershed (Excerpt)**

VAW-L08R (Upper James River Watershed)  
 4AGCR000.01 (Rt 739 bridge at Algoma, upstream of Callaway Elementary School)

Collection Date Time	Temp Celsius	Field pH (S.U.)
07/11/2001 10:30	22.7	7.9
09/25/2001 11:00	15.2	8.1
11/08/2001 10:00	9.3	7.8
01/07/2002 10:30	4.4	8.3
05/21/2002 09:50	10	8.46
07/24/2002 09:00	20.9	9.14
09/18/2002 09:20	20.8	8.62
11/05/2002 10:05	9.9	7.17
01/22/2003 10:30	1.3	6.98
03/13/2003 13:00	10.9	7.4
05/27/2003 12:30	13.5	7.9
08/02/2005 13:15	21.6	7.4
12/08/2005 11:35	4.5	7.6
02/07/2006 13:00	4.6	7.1
04/20/2006 15:20	19.4	7.2
06/06/2006 12:40	17	7.1
08/02/2006 11:45	22.5	7.2
10/02/2006 14:45	16.5	6.7
12/12/2006 15:00	7.3	7.3
01/10/2007 13:25	5.5	7.2
03/07/2007 12:35	7.9	7.3
05/29/2007 13:30	19	7.3
07/12/2007 12:00	19.2	7.5
09/13/2007 13:00	19	7.4
11/27/2007 13:30	10.4	6.4
01/08/2008 13:10	9.1	7.3
03/11/2008 12:40	8	7.3
05/13/2008 12:50	14.2	NULL
07/08/2008 12:40	18.9	7.5
09/11/2008 14:10	17.6	7.2
11/18/2008 12:40	6.5	7
02/19/2009 12:00	6.2	7.7
04/09/2009 12:55	11.2	7.4
06/04/2009 11:55	16.3	7.5
08/04/2009 12:05	18.5	7.5
10/05/2009 12:15	14.3	7.3
12/15/2009 13:15	10.2	7.2
02/23/2010 14:00	7.8	7.3
04/08/2010 13:30	16	7.5
06/22/2010 12:50	22.5	7
08/09/2010 13:00	22.6	7.5
10/21/2010 14:10	14.7	7.3
12/28/2010 12:40	0.5	7.5

90th Percentile Temperature 21.5 °C  
 90th Percentile Temperature 17.2 °C  
 90th Percentile pH 8.1 S.U.  
 10th Percentile pH 7.0 S.U.

January - May

VAW-L08R

STORET Station 4AGCR000.01 (upstream of Callaway Elementary School WWTP)

Rt. 739 bridge at Algoma (Franklin County)

Collection Date Time	Hardness, Total (mg/L as CaCO <sub>3</sub> )
7/11/2001 10:30	22.1
9/25/2001 11:00	19
11/8/2001 10:00	26
1/7/2002 10:30	15.5
5/21/2002 9:50	24.4
7/24/2002 9:00	22.4
9/18/2002 9:20	52.8
11/5/2002 10:05	31.9
1/22/2003 10:30	15.5
3/13/2003 13:00	17.6
5/27/2003 12:30	12.9

Mean Hardness        23.6        mg/L

(Use 25 mg/L as lowest value valid for wasteload allocation spreadsheet.)



# 2012 Impaired Waters

## Categories 4 and 5 by DCR Watershed\*

### Roanoke and Yadkin River Basins

#### Fact Sheet prepared for DCR Watershed: L08\*

Cause Group Code: **L08R-02-BAC**

**Blackwater River, South Fork**

Location: South Fork Blackwater waters from the Rt. 739 Bridge in Algoma, Va. (Callaway Quad) on downstream just west of the Rt. 641 Bridge where the North and South Forks join forming the Blackwater River.

City / County: Franklin Co.

Use(s): Recreation

Cause(s) /

VA Category: Escherichia coli/ 4A

The South Fork Blackwater River Bacteria Total Maximum Daily Load (TMDL) is U.S. EPA approved 2/02/2001 [Fed. IDs: 1886 / 7791 / 21330 / 24549] and SWCB approved 6/17/2004. The Bacteria Implementation Plan (IP) is SWCB approved 6/17/2004. The waters are originally 303(d) Listed in 1996 for fecal coliform bacteria (FC) for 6.04 miles.

The Upper Blackwater River Bacteria Implementation Plan is complete as of 8/23/2001 with SWCB approval on 6/17/2004. The TMDL Study identified Wildlife as a major source based on TMDL Bacteria Source Tracking (BST). The Bacteria Implementation Plan encompasses the Upper Blackwater River (L08R), the North and South Forks, Little and Teels Creeks. The entirety of the approved TMDL Study and Implementation Plans can be viewed at <http://www.deq.virginia.gov>.

The South Fork Blackwater River 1996 303(d) Listed impairment is originally based on a 319 funded special study (SS 925102) data and ambient fecal coliform bacteria sample collections. Abundant fecal coliform bacteria counts failed to support the recreational use by exceedances of both the former fecal coliform (FC) geometric mean (200 cfu/100 ml & 2 samples 30 day) and former (2002) instantaneous criterion of 1000 cfu/100 ml. Escherichia coli (E.coli) now replaces fecal coliform as the bacteria indicator in the Blackwater River drainage as per Water Quality Standards [9 VAC 25-260-170. Bacteria; other waters]. The 6.06 mile bacteria impairment remains.

4ABSF001.15- (Rt. 641 Bridge east of Callaway) Twenty-nine of 36 Escherichia coli (E.coli) samples exceed the 235 cfu/10 ml instantaneous within the 2012 data window. Values in excess of the criterion range from 250 to greater than 2000 cfu/100 ml. 2010 E.coli results find 25 of 33 samples exceeding the instantaneous criterion where excessive values range from 280 cfu/100 ml to greater than 2000. 2008 E.coli samples exceed the instantaneous criterion in 19 of 27 samples. Excursions range from 420 to greater than 2000 cfu/100 ml. Twenty of 26 samples exceed the instantaneous criterion in 2006 ranging from 250 to greater than 2000 cfu/100 ml.

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAW-L08R_BSF01A00 / S.F. Blackwater River / South Fork of the Blackwater River mainstem from the Callaway Community downstream to the South Fork's confluence with the North Fork of the Blackwater River.	4A Escherichia coli		2004	2/2/2001	2.23
VAW-L08R_BSF02A00 / S.F. Blackwater River / South Fork of the Blackwater River mainstem from Algoma, Green Creek mouth, downstream to the Callaway community.	4A Escherichia coli		2004	2/2/2001	3.81

Blackwater River, South Fork

DCR Watershed: L08\*

Recreation

Estuary (Sq. Miles) Reservoir (Acres) River (Miles)

Escherichia coli - Total Impaired Size by Water Type:

**6.04**



# 2012 Impaired Waters

## Categories 4 and 5 by DCR Watershed\*

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### Roanoke and Yadkin River Basins

**Fact Sheet prepared for DCR Watershed: L08\***

**Sources:**

Livestock (Grazing or  
Feeding Operations)

On-site Treatment Systems  
(Septic Systems and  
Similar Decentralized  
Systems)

Unspecified Domestic  
Waste

Wildlife Other than  
Waterfowl

\*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.



# 2012 Impaired Waters

## Categories 4 and 5 by DCR Watershed\*

### Roanoke and Yadkin River Basins

#### Fact Sheet prepared for DCR Watershed: L08\*

Cause Group Code: **L08R-02-TEMP**      **Blackwater River, South Fork**

Location: South Fork Blackwater waters from the Rt. 739 Bridge in Algoma, Va. (Callaway Quad) on downstream just west of the Rt. 641 Bridge where the North and South Forks join forming the Blackwater River.

City / County: Franklin Co.

Use(s): Aquatic Life

Cause(s) /

VA Category: Temperature, water/ 5C

The Temperature impairment on the South Fork Blackwater River returns with the 2012 Integrated Report (IR). The temperature impairment has previously been de-listed in 2004 and 2010.

4ABSF001.15- (Rt. 641 Bridge east of Callaway) Five of 36 temperature measurements exceed the Class V Stockable Trout waters criterion of 21 °C. Exceedances occur in the summer months of June and August and range from 22.4 to 24.1°C. The South Fork Blackwater River was delisted in 2004 for temperature but returned with the 2008 assessment.

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAW-L08R_BSF01A00 / S.F. Blackwater River / South Fork of the Blackwater River mainstem from the Callaway Community downstream to the South Fork's confluence with the North Fork of the Blackwater River.	5C Temperature, water		2012	2024	2.23
VAW-L08R_BSF02A00 / S.F. Blackwater River / South Fork of the Blackwater River mainstem from Algoma, Green Creek mouth, downstream to the Callaway community.	5C Temperature, water		2012	2024	3.81

Blackwater River, South Fork

DCR Watershed: L08\*

Aquatic Life

Estuary (Sq. Miles)      Reservoir (Acres)      River (Miles)

Temperature, water - Total Impaired Size by Water Type:

**6.04**

Sources:

Source Unknown

\*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

# **Fecal Coliform TMDL (Total Maximum Daily Load) Development for South Fork of the Blackwater River, Virginia**

**Prepared By**

**MapTech Inc., Blacksburg, VA  
for**

**Virginia Department of Environmental Quality, and  
Virginia Department of Conservation and Recreation**

***December 27, 2000***

*EPA approved 2/2/01  
SWCB approved 6/17/04*

## EXECUTIVE SUMMARY

### ***Fecal Coliform Impairment***

The South Fork of the Blackwater River was placed on the Commonwealth of Virginia's 1998 303(d) List of Impaired Waters because of violations of the fecal coliform bacteria water quality standard. Based on exceedances of this standard recorded at Virginia Department of Environmental Quality (VADEQ) monitoring stations, the stream does not support primary contact recreation (e.g. swimming, wading, and fishing). The applicable state standard specifies that the number of fecal coliform bacteria shall not exceed a maximum allowable level of 1,000 colony forming units (cfu) per 100 milliliters (ml) (Virginia State Law 9VAC25-260-170). Alternatively, if data are available, the geometric mean of 2 or more observations taken in a thirty-day period should not exceed 200 cfu/100 ml. A review of available monitoring data for the study area indicated that fecal coliform bacteria were consistently elevated above the 1,000 cfu/100 ml standard. In TMDL development, the geometric mean standard of 200 cfu/100 ml was used, since continuous simulated data was available.

### ***Sources of Fecal Coliform***

Potential sources of fecal coliform include both point source and nonpoint source contributions. Nonpoint sources include wildlife; grazing livestock; land application of manure; land application of biosolids; urban/suburban runoff; failed, malfunctioning, and operational septic systems, and uncontrolled discharges (straight pipes, dairy parlor waste, etc.). To account for un-quantifiable loads from known wildlife species, a background load was applied to all land segments equal to 10% of the total wildlife load quantified. Calloway Elementary School is the only permitted point discharge in the South Fork Blackwater drainage area.

### ***Water Quality Modeling***

The US Geological Survey (USGS) Hydrologic Simulation Program - Fortran (HSPF) water quality model was selected as the modeling framework to simulate existing conditions and perform TMDL allocations. In establishing the existing and allocation conditions, seasonal variations in hydrology, climatic conditions, and watershed activities were explicitly accounted for in the model.

Thirty-minute flows from the US Geological Survey gage (#02056900) on the Blackwater River, at Smith Mountain Lake, VA, were used to calibrate hydrologic flows for the Blackwater River watershed in the HSPF model, thereby improving confidence in computed discharges generated by the model. The representative hydrologic period used for calibration ran from October 1, 1994 through September 30, 1998. The model was validated using daily flows recorded at the same gauging station from October 1, 1980 through September 30, 1981 and from January 1, 1991 through September 30, 1994. The time periods covered by calibration and validation represent a broad range of hydrologic and climatic conditions and is representative of the 20-year precipitation and discharge

***Margin of Safety***

In order to account for uncertainty in modeled output, a margin of safety (MOS) was incorporated into the TMDL development process. A margin of safety can be incorporated implicitly in the model through the use of conservative estimates of model parameters, or explicitly as an additional load reduction requirement. Individual errors in model inputs, such as data used for developing model parameters or data used for calibration, may affect the load allocations in a positive or a negative way. The purpose of the MOS is to avoid an overall bias toward load allocations that are too large for meeting the water quality target. An explicit MOS equal to 5% of the targeted geometric mean concentration of 200 cfu/100 ml was used in the development of this TMDL. As a result, allocations were made based on a modeled 30-day geometric mean not exceeding 190 cfu/100 ml.

***Recommendations for TMDL Implementation***

The goal of this TMDL was to develop an allocation plan that can be met during the implementation phase. Virginia's 1997 Water Quality Monitoring, Information and Restoration Act states in section 62.1-44.19.7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". To this end, funds have been approved to immediately follow this TMDL development to establish a monitoring scheme and to develop the strategies for a phased implementation plan for restoring the water quality of the South Fork Blackwater impairment to levels identified in this TMDL.

The TMDL developed for the South Fork Blackwater impairment provides allocation scenarios that will be a starting point for developing implementation strategies. Modeling shows that periods of low flow are the most critical for water quality. This result points out the need to reduce direct deposition of fecal coliform bacteria to the stream. Additional monitoring aimed at targeting these reductions is critical to implementation development. Bacteria source tracking to identify sources of contamination and an improved inventory of wildlife in the impairment area will contribute greatly to the implementation effort. Once established, continued monitoring will aid in tracking success toward meeting water quality milestones.

A phased implementation plan is essential to the process of restoring water quality. The goal of the first phase is to foster local support for the implementation plan. The modeled scenario developed for the first phase included a 50% reduction in failed septic systems, a conversion of 50% of poor pasture to good pasture, a 100% reduction in uncontrolled discharges, and a 90% reduction in direct deposition by livestock. The land-based load reductions prescribed for the first phase of the implementation plan are not incorporated into the final allocation, since their use does not ensure zero violations of the water quality standard. The first phase of the implementation represents preliminary steps in achieving the final allocation. A phased implementation plan is necessarily an iterative process. There is a measure of uncertainty associated with the final allocation development process. Continued monitoring can provide insight into the effectiveness of

## 1. INTRODUCTION

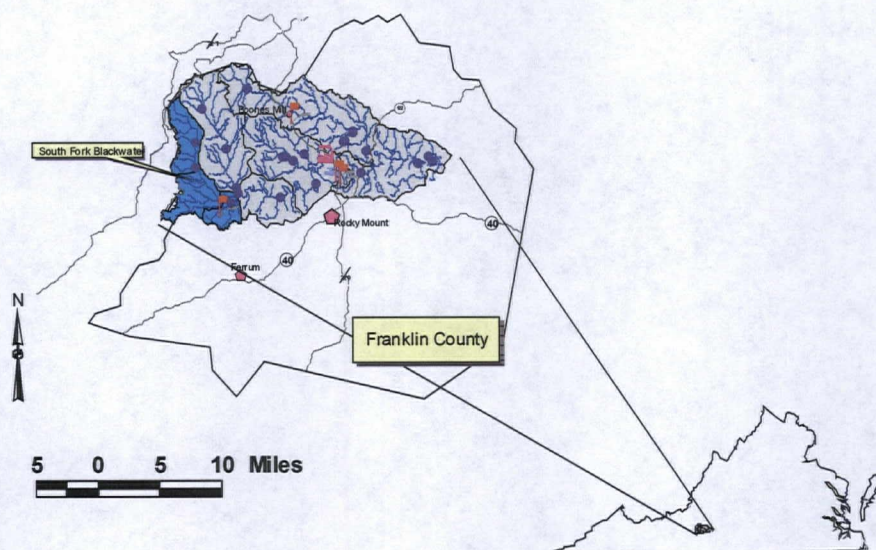
### 1.1 Background

EPA's document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (USEPA, 1999) states:

*According to section 303(d) of the Clean Water Act and EPA water quality planning and management regulations, States are required to identify waters that do not meet or are not expected to meet water quality standards even after technology-based or other required controls are in place. The waterbodies are considered water quality-limited and require TMDLs .*

*. . . A TMDL, or total maximum daily load, is a tool for implementing State water quality standards and is based on the relationship between pollution sources and in-stream water quality conditions. The TMDL establishes the allowable loadings or other quantifiable parameters for a waterbody and thereby provides the basis for States to establish water quality-based controls. These controls should provide the pollution reduction necessary for a waterbody to meet water quality standards.*

According to the 1998 303(d) Total Maximum Daily Load Priority List and Report (VADEQ, 1998), the South Fork Blackwater is prioritized as "high" on the list for TMDL development and carries an agency watershed ID of VAW-L08R. VADEQ has identified the South Fork of the Blackwater River as being impaired with regard to the fecal coliform bacteria water quality standard. The impaired stream segment has a length of 6.05 miles, beginning in the headwaters of the South Fork and ending near Callaway, VA where the North and South Forks join to form the Blackwater River.



**Figure 1.1 Location of the South Fork Blackwater watershed.**

The South Fork of the Blackwater River is part of the Blackwater River watershed, located in Franklin County, Virginia, just north of Rocky Mount and approximately 15 miles to the south of Roanoke, Virginia (Figure 1.1). The Blackwater River watershed empties into Smith Mountain Lake, a reservoir on the Roanoke River. The Roanoke River flows southeast through a series of two additional reservoirs (John H. Kerr Reservoir and Gaston Lake), eventually emptying into the Albemarle Sound. The Blackwater River watershed is located within the Upper Roanoke hydrologic unit (USGS No. 03010101), and the Virginia hydrologic planning unit L08. The total area of the Blackwater River watershed is approximately 108,000 acres, with forest and agriculture as the primary land uses (Figure 1.2). Of this, the South Fork Blackwater watershed is approximately 17,706 acres comprised of forest (75.0%), agricultural (23.7%), and urban (1.3%) land uses. The estimated population within the South Fork Blackwater drainage area in 1999 was 653. Franklin County ranks 2<sup>nd</sup>, among Virginia counties, for the number of Dairy cows, 6<sup>th</sup> for the number of all cattle and calves, 19<sup>th</sup> for beef cattle, and 3<sup>rd</sup> for corn silage. (VASS, 1999). The Blackwater River Watershed received average annual precipitation of approximately 47 inches, and produced an average annual runoff volume of approximately 17 inches between 1977 and 1998.

### 3. SOURCE ASSESSMENT

The TMDL development described in this report included examination of all potential sources of fecal coliform in the South Fork Blackwater watershed. The source assessment was used as the basis of model development and ultimate analysis of TMDL allocation options. In evaluation of the sources, loads were characterized by the best available information, landowner input, literature values, and local management agencies. This section documents the available information and interpretation for the analysis. The source assessment chapter is organized into point and nonpoint sections. The representation of the following sources in the model is discussed in Section 4.

#### 3.1 Assessment of Point Sources

Six point sources are permitted to discharge in the Black Water River watershed through the Virginia Pollutant Discharge Elimination System (VPDES). Figure 3.1 shows their discharge locations. Permitted point discharges that may contain pathogens associated with fecal matter are required to maintain a fecal coliform concentration below 200 cfu/100 ml. One method for achieving this goal is chlorination. Chlorine is added to the discharge stream at levels intended to kill off any pathogens. The monitoring method for ensuring the goal is to measure the concentration of total residual chlorine (TRC) in the effluent. If the concentration is high enough, pathogen concentrations, including fecal coliform concentrations, are considered reduced to acceptable levels. Typically, if minimum TRC levels are met, fecal coliform concentrations are reduced to levels well below the 200 cfu/100 ml limit.

Calloway Elementary School is the only permitted point discharge in the South Fork Blackwater drainage area. No information was available on this discharge prior to 1995 when the first VPDES permit was issued by VADEQ. According to the current VPDES permit (#VA0088561), Calloway Elementary has a design discharge of 0.0019 mgd, and is required to maintain a TRC level between 1 and 2 mg/l. Discharge and TRC levels are recorded from November 1997 to present.

## 5.2 Incorporation of a Margin of Safety

A margin of safety (MOS) was incorporated into the TMDL in an effort to account for scientific errors inherent to the TMDL development process, measurement uncertainty in model parameters, and to account for trends which might prevent the water quality goal, as targeted by the TMDL, from being achieved. Scientific errors arise from our inability to fully describe mathematically the processes and mechanisms through which pollutants are delivered to the stream. Model calibration is an attempt to address these errors through adjusting model parameters until a suitable fit to observed data is achieved. Measurement uncertainty also introduces errors in the model calibration, because model parameters that are adjusted to non-representative conditions result in model simulations being biased either low or high. For example, observed data used for model calibration were collected for the purpose of detecting violations of the state's water quality standards. As a result, sample analyses are arbitrarily censored at a level above the state standard. This introduces modeling uncertainty during events that produce high pollutant concentrations. To insure a pollutant reduction, long-term trends in pollutant sources must be considered in load allocations. For instance, if livestock populations within the targeted watershed are increasing, then a larger MOS might be appropriate to account for the expected increase in loads.

The MOS is a subjective value, representing a balance between complete certainty of reaching the in-stream standard and not meeting the standard. The MOS was entered explicitly as 5% of the maximum 30-day geometric mean standard (200 cfu/100 ml). The result was that allocation scenarios were developed with the goal of maintaining the modeled 30-day geometric mean below 190 cfu/100 ml.

## 5.3 Scenario Development

Allocation scenarios were modeled using HSPF. Existing conditions (Table 5.1) were adjusted until the water quality standard was attained. The standard included the geometric mean of 200 cfu/100mL along with the MOS described in Section 5.2. The development of the allocation scenario was an iterative process that required numerous runs with each followed by an assessment of source reduction against the water quality target. Additional reductions were made until the target was achieved.

### 5.3.1 Wasteload Allocations

Only one point source is currently discharging fecal coliform in the South Fork Blackwater impairment. This source, Calloway Elementary School, permitted to discharge  $1.4 \times 10^7$  cfu/day, was considered negligible in the impact on in-stream fecal coliform levels. The allocation of the point source, Calloway Elementary School, was equivalent to its current permit levels (0.0019 mgd and 200 cfu/100 ml).

### 5.3.2 Load Allocations

Load allocations to nonpoint sources are divided into land-based loadings from land uses and direct applied loads in the stream (e.g. livestock, septic systems within 50 feet of a stream, and wildlife). Source reductions include those that are affected by both high and

## Addendum A:

The TMDL developed for the South Fork of the Blackwater River was based on the Virginia State Standard for fecal coliform. As detailed in Section 1.2, the fecal coliform standard states that the 30-day, geometric-mean concentration shall not exceed 200 cfu/100 ml. As such, pollutant concentrations were modeled over the entire duration of a representative modeling period, and pollutant loads were adjusted until the standard, reduced by a margin of safety equal to 5%, was met (Figure 5.5). Table AA.1 represents the average annual loads during the modeled period after allocation of pollutant loads. Loads from permitted point sources (WLA) and nonpoint sources (LA) are represented, as are the load associated with the margin of safety (MOS) and the sum of these three loads (TMDL). It is worth noting that the MOS is much less than 5% of the TMDL. This outcome illustrates the inherent difference between concentration, which is the amount of a pollutant (e.g. numbers of fecal coliforms) in a given volume of water, and annual loads, which is the total amount of the pollutant regardless of the volume of water. Additionally, this situation reflects the fact that it would be inappropriate to use annual loads, such as those in Table AA.1, as a target goal for meeting a water quality standard that is based on concentrations.

**Table AA.1 Average annual loads (cfu/year) modeled after TMDL allocation in the South Fork of the Blackwater River Watershed.**

<b>Impairment</b>	<b>WLA</b>	<b>LA</b>	<b>MOS</b>	<b>TMDL</b>
South Fork <sup>1</sup>	2.80E+09	4.06E+14	2.57E+12	4.09E+14

<sup>1</sup> The only point source permitted for fecal control in the South Fork Blackwater drainage is Calloway Elementary School (VPDES # VA0088561).

## Addendum B:

There is a typographical error in Table 3.10. The third column is incorrectly labeled as "Direct Deposition." The correct label is "Portion of Day in Stream Access Areas," as reproduced correctly in the table below.

**Table 3.10 Average fecal coliform densities and percentage of time spent in stream access areas for wildlife.**

Type	Fecal Coliform	Portion of Day in
	Density (FC/gm)	Stream Access Areas (%)
Raccoon	13,100,000	5
Muskrat	1,900,000	90
Beaver	1,000	100
Deer	3,300,000	5
Turkey	1,332	5
Goose	320	50
Duck	490	75

## **Decision Rationale**

### **Total Maximum Daily Load of Fecal Coliform for South Fork of the Blackwater River**

#### **I. Introduction**

This document will set forth the Environmental Protection Agency's (EPA) rationale for approving the Total Maximum Daily Load (TMDL) of Fecal Coliform for the South Fork of the Blackwater River submitted for final Agency review on January 04, 2001. Our rationale is based on the TMDL submittal document to determine if the TMDL meets the following 8 regulatory conditions pursuant to 40 CFR §130.

1. The TMDLs are designed to implement applicable water quality standards.
2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
3. The TMDLs consider the impacts of background pollutant contributions.
4. The TMDLs consider critical environmental conditions.
5. The TMDLs consider seasonal environmental variations.
6. The TMDLs include a margin of safety.
7. The TMDLs have been subject to public participation.
8. There is reasonable assurance that the TMDLs can be met.

#### **II. Background**

Located in Franklin County, Virginia, the overall Blackwater watershed is approximately 108,000 square acres. The South Fork of the Blackwater River watershed comprises 17,706 acres. The TMDL addresses 6.05 stream miles from the headwaters of the South Fork of the Blackwater to its confluence with the North Fork of the Blackwater. Forest is the major land use in the watershed and makes up roughly 75% of the 17,706 acre watershed.

In response to Section 303 (d) of the Clean Water Act (CWA), the Virginia Department of Environmental Quality (VADEQ) listed 6.05 miles of the South Fork of the Blackwater River as being impaired by elevated levels of fecal coliform on Virginia's 1998 303 (d) list. The South Fork of the Blackwater River was listed for violations of Virginia's fecal coliform bacteria standard for primary contact. Fecal Coliform is a bacterium which can be found within the intestinal tract of all warm blooded animals. Therefore, fecal coliform can be found in the fecal wastes of all warm blooded animals. Fecal coliform in itself is not a pathogenic organism. However, fecal coliform indicates the presences of fecal wastes and the potential for the existence of other pathogenic bacteria. The higher concentrations of fecal coliform indicate the elevated likelihood of increased pathogenic organisms.

EPA has been encouraging the States to use e-coli and enterococci as the indicator species instead of fecal coliform. A better correlation has been drawn between the

concentrations of e-coli (and enterococci) and the incidence of gastrointestinal illness. The Commonwealth is pursuing changing the standard from fecal coliform to e-coli.

Virginia designates all of its waters for primary contact, therefore all waters must meet the current fecal standard for primary contact. Virginia's standard is to apply to all streams designated as primary contact for all flows. Through the development of this and other similar TMDLs it was discovered that natural conditions (wildlife contributions to the streams) were causing violations of the standard during low flows. Thus many of Virginia's TMDLs have called for some reduction in the amount of wildlife contributions to the stream. EPA believes that a significant reduction in wildlife is not practical and will not be necessary due to implementation discussion below.

A phased implementation plan will be developed for all streams in which the TMDL calls for reductions in wildlife. The first phase of the implementation will reduce all sources of fecal coliform to the stream other than wildlife. In phase 2, which can occur concurrently to phase 1, the Commonwealth will consider addressing its standards to accommodate this natural loading condition. During phase 2, the Commonwealth has indicated that it will evaluate the following items in relation to the standard. 1) The possibility of placing a minimum flow requirement upon the bacteriological standard. As a result, the standard may not apply to flows below the minimum (possibly 7Q10). This application of the standard is applied in many States. 2) May develop a Use Attainability Analysis (UAA) for streams with wildlife reductions which are not used for frequent bathing. Depending upon the result of that UAA, it is possible that these streams could be designated primary contact infrequent bathing. 3) The Commonwealth will also investigate incorporating a natural background condition for the bacteriological indicator.

After the completion of phase 1 of the implementation plan the Commonwealth will monitor to determine if the wildlife reductions are actually necessary, as the violation rate associated with the wildlife loading may be smaller than the percent error of the model. In phase 3, the Commonwealth will investigate the sampling data to determine if further load reductions are needed in order for these waters to attain standards. If the load reductions and/or the new application of standards allow the stream to attain standards, then no additional work is warranted. However, if standards are still not being attained after the implementation of phases 1 and 2 further work and reductions will be warranted.

The South Fork of the Blackwater River identified as watershed VAW-L08R, was given a high priority for TMDL development. Section 303 (d) of the Clean Water Act and its implementing regulations require a TMDL to be developed for those waterbodies identified as impaired by the State where technology-based and other controls do not provide for the attainment of Water Quality Standards. The TMDL submitted by Virginia is designed to determine the acceptable load of fecal coliform which can be delivered to the South Fork of the Blackwater River, as demonstrated by the Hydrologic Simulation Program Fortran (HSPF)<sup>1</sup>, in

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<sup>1</sup>Bicknell, B.R., J.C. Imhoff, J.L. Little, and R.C. Johanson. 1993. Hydrologic Simulation Program-FORTRAN (HSPF): User's Manual for release 10.0. EPA 600/3-84-066. U.S.

order to ensure that the water quality standard is attained and maintained. HSPF is considered an appropriate model to analyze this watershed because of its dynamic ability to simulate both watershed loading and receiving water quality over a wide range of conditions.

The TMDL analysis allocates the application/deposition of fecal coliform to land based and instream sources. For land based sources, the HSPF model accounts for the buildup and washoff of pollutants from these areas. Buildup (accumulation) refers to all of the complex spectrum of dry-weather processes that deposit or remove pollutants between storms.<sup>2</sup> Washoff is the removal of fecal coliform which occurs as a result of runoff associated with storm events. These two processes allow the HSPF model to determine the amount of fecal coliform from land based sources which is reaching the stream. Point sources and wastes deposited directly to the stream were treated as direct deposits. These wastes do not need a transport mechanism to allow them to reach the stream. The allocation plan calls for the reduction in fecal coliform wastes delivered by cattle in-stream and septic systems.

Table #1 summarizes the specific elements of the TMDL.

Parameter	TMDL (cfu/yr)	WLA (cfu/yr)	LA (cfu/yr)	<i>MOS</i> <sup>1</sup> (cfu/yr)
Fecal Coliform	4.09 x 10 <sup>14</sup>	2.80 x 10 <sup>9</sup>	4.06 x 10 <sup>14</sup>	2.57 x 10 <sup>12</sup>

<sup>1</sup> Virginia includes an explicit MOS by identifying the TMDL target as achieving the total fecal coliform water quality concentration of 190 cfu/100ml as opposed to the WQS of 200 cfu/ml. This can be viewed explicitly as a 5% MOS.

EPA believes it is important to recognize the conceptual difference between the WLA values, LA values for sources modeled as direct deposition to stream segments, and LA values for flux sources of fecal coliform to land use categories. The WLA values and LA values for direct sources represent amounts of fecal coliform which are actually deposited into the stream segments. However, LA values for flux sources represent amounts of fecal coliform deposited to land. The actual amount of total nitrogen which reaches the stream segments will be significantly less than the amount of fecal coliform deposited to the land. The HSPF model, which considers landscape processes which affect fecal coliform runoff from land uses, determines the amount of fecal coliform which reaches the stream segments. The LA in table #1 is the amount of cfu reaching the stream from nonpoint sources annually.

The United States Fish and Wildlife Service has been provided with copy of this TMDL..

### III. Discussion of Regulatory Conditions

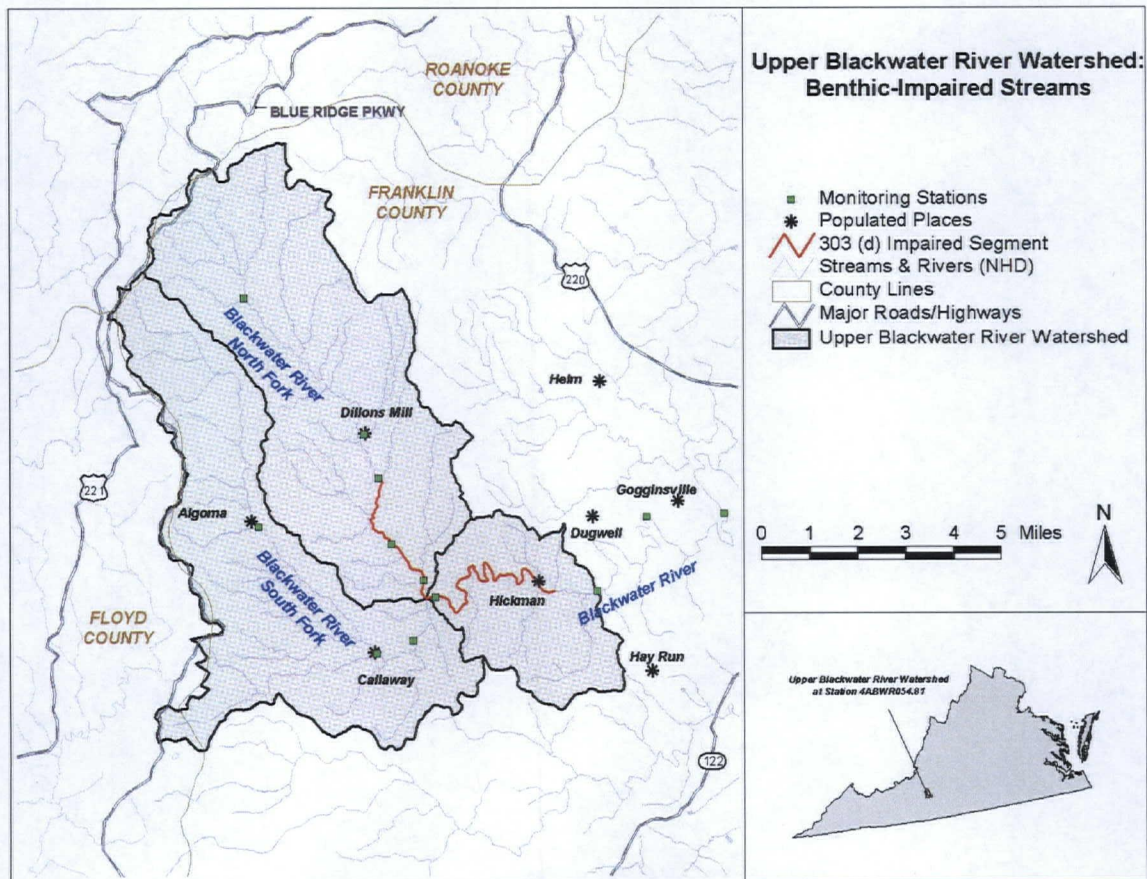
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Environmental Protection Agency, Environmental Research Laboratory, Athens, GA.

<sup>2</sup>CH2MHILL, 2000. Fecal Coliform TMDL Development for Cedar, Hall, Byers, and Hutton Creeks Virginia,

# Total Maximum Daily Load (TMDL) Development for the Upper Blackwater River Watershed

## *Aquatic Life Use (Benthic) Impairment*



*Prepared by:*

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*Prepared for:*

U.S. Environmental Protection Agency, Region III  
Virginia Department of Environmental Quality

**Final - January 2004**

EPA Approved 4/26/04

SWCB Approved 8/31/04

## **Executive Summary**

### **Background**

The Upper Blackwater River watershed is located in Franklin County, Virginia, in the Roanoke River Basin (USGS Hydrologic Unit Code, 03010101) (Figure 1.1). The watershed lies just north of Rocky Mount, Virginia and approximately 15 miles south of Roanoke, Virginia. The Blackwater River flows southeastward and empties into Smith Mountain Lake. The waterbody identification code (WBID, Virginia Hydrologic Unit) for these streams is VAW-L08R.

Virginia 305(b)/303(d) guidance states that support of the aquatic life beneficial use is determined by the assessment of conventional pollutants (dissolved oxygen, pH, and temperature); toxic pollutants in the water column, fish tissue and sediments; and biological evaluation of benthic community data (VADEQ 1997). Benthic community assessments are, therefore, used to determine compliance with the General Criteria section of Virginia's Water Quality Standards (9 VAC 25-260-20). In general, the stream reach that a biomonitoring station represents is classified as impaired if the EPA's Rapid Bioassessment Protocol (RBP) ranking is either moderately or severely impaired. As a result, the Blackwater River (upper and middle segments) and North Fork Blackwater River were listed as impaired due to violations of the general standard (aquatic life).

Water quality data analyses and field observations indicate that the primary cause of the benthic community impairment in the mainstem and North Fork Blackwater River is increased amounts of sediment. Phosphorus is also identified as a stressor for the North Fork. In order to improve water quality conditions that have resulted in benthic community impairments, Total Maximum Daily Loads (TMDLs) were developed for the impaired streams, taking into account all sources of sediment and phosphorus in the watersheds, plus a margin of safety (MOS).

Upon implementation, the TMDLs will ensure that water quality conditions relating to benthic impairment will meet the allowable loadings estimated by use of a reference watershed (a non-impaired watershed with characteristics similar to those of the impaired watersheds).

### **Sources of Sediment and Phosphorus**

Sediment and phosphorus sources can be divided into point and nonpoint sources. There are three point sources in the Upper Blackwater River watershed (Table 1). Two of the point sources in the watershed were issued VPDES general permits and one was issued a municipal discharge permit. The Clover Meadow Dairy Farm is a combined animal feeding operation (CAFO) and is listed as a no-discharge facility.

impaired due to high bacteria concentrations. TMDLs for fecal coliform bacteria were developed by the Commonwealth of Virginia in October 2000 (VADEQ and VADCR 2000). This report specifically addresses the benthic community impairments in the Upper Blackwater River watershed.

## 1.1.3 Watershed Location

The Upper Blackwater River watershed is located in Franklin County, Virginia, in the Roanoke River Basin (USGS Hydrologic Unit Code, 03010101) (Figure 1.1). The watershed is located just north of Rocky Mount, Virginia and approximately 15 miles south of Roanoke, Virginia. The Blackwater River flows southeastward and empties into Smith Mountain Lake. The waterbody identification code (WBID, Virginia Hydrologic Unit) is VAW-L08R.

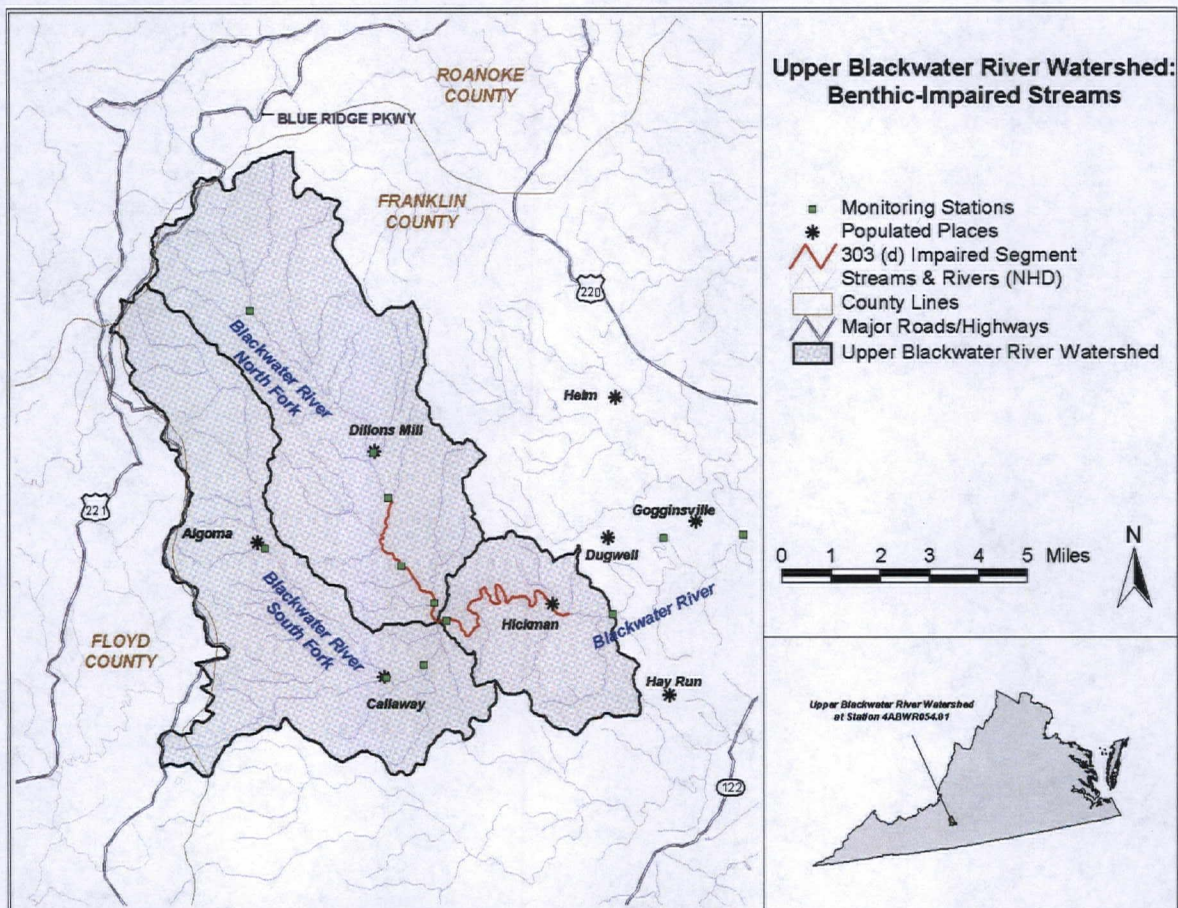


Figure 1-1 Location of impaired watershed

## **SECTION 1**

### **INTRODUCTION**

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#### **1.1 Background**

##### **1.1.1 TMDL Definition and Regulatory Information**

Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are exceeding water quality standards. TMDLs represent the total pollutant loading that a waterbody can receive without violating water quality standards. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and in-stream water quality conditions. By following the TMDL process, states can establish water quality based controls to reduce pollution from both point and nonpoint sources to restore and maintain the quality of their water resources (USEPA 1991).

##### **1.1.2 Impairment Listing**

The Blackwater River and North Fork Blackwater River were listed as impaired on Virginia's Section 303(d) Total Maximum Daily Load Priority List and Report due to violations of the General Standard (VADEQ 1996, 1998, and 2002). This designation was based on benthic macroinvertebrate community assessments conducted since 1996 which indicate partial or non-support of the Aquatic Life Use. In 1996, the Blackwater River mainstem (upper and middle segments) was listed as impaired from the confluence of the North and South Forks downstream to an unnamed tributary located approximately 1 mile downstream of a private bridge off Rt. 921. The entire length of the North Fork Blackwater River was listed as impaired in 1996. The upstream limit of the North Fork Blackwater impaired segment was re-designated at the Rt. 739 bridge crossing in 1998 based on biomonitoring data collected since 1996. Recent data indicates improved conditions in the Middle Blackwater River segment and the lower portion of the Upper Blackwater River segment. Based on these data, the Upper Blackwater River impaired segment currently includes that portion of the river from the North Fork/South Fork confluence to approximately 0.10 miles below Rt. 737 (Hickman Rd.) (5.62 miles in length). The North Fork Blackwater River impaired segment remains unchanged from the 1998 listing (3.26 miles in length). The current reference site used in bioassessment is located on Big Chestnut Creek, just below the Rt. 715 bridge crossing (transitional Blue Ridge to Piedmont). The Aquatic Life Use is also listed as threatened for 20.86 miles on the Blackwater river due to periodic exceedances of the phosphorus threshold value of 0.2 mg/L. In addition, the North Fork, South Fork, Upper, and Middle Blackwater River segments were listed as

## **Benthic TMDL Development for the Upper Blackwater River Watershed**

of hydrologic conditions, including low- and high-flow conditions as well as seasonal variations. The calibrated GWLF model adequately simulated the hydrology of the impaired watershed.

TMDL development requires the identification of impairment causes and the establishment of numeric endpoints that will allow for the attainment of designated uses and water quality criteria. Numeric endpoints represent the water quality goals that are to be achieved by implementing the load reductions specified in the TMDL. Virginia does not currently have numeric criteria for nutrients (i.e. total phosphorus and total nitrogen), sediment, and other parameters that may be contributing to the impaired condition of the benthic community in these streams. Therefore, a reference watershed approach was used to determine the primary benthic community stressors and to establish numeric endpoints for these stressors. This approach is based on selecting a non-impaired watershed that shares similar land use, ecoregion, and geomorphological characteristics with the impaired watershed. Stream conditions in the reference watershed are assumed to be representative of the conditions needed for the impaired stream to attain its designated uses. Big Chestnut Creek was chosen as the reference watershed and any reductions of sediment and phosphorus from the impaired waterbodies were based on the reference loads of sediment and phosphorus in the Big Chestnut Creek watershed.

### **Existing Conditions**

Impaired and reference watershed models were calibrated for hydrology using different modeling periods and weather input files. To establish baseline (reference watershed) loadings for sediment and phosphorus the GWLF model for Big Chestnut Creek was used. For TMDL calculation both the calibrated reference and impaired watersheds were modeled for a 12 and a half year period from 4/1/1990 to 12/31/2002. This was done to standardize the modeling period. In addition, the total area for the reference watershed was reduced to be equal to its paired target watershed. This was necessary because watershed size influences sediment delivery to the stream and other model variables.

The 12-year means for pollutants of concern were determined for each land use/source category in the reference and the impaired watershed. This modeling period was used, after calibration, to represent a broad range of recent weather and hydrologic conditions.

### **Margin of Safety**

While developing allocation scenarios for the TMDL, an explicit margin of safety (MOS) of ten percent was used. Ten percent of the reference sediment load was calculated and added to the sum of the load allocation (LA) and wasteload allocation (WLA) to produce the TMDL. It is assumed that a MOS of 10% will account for any uncertainty in the data and the computational methodology used for the analysis, as well as provide an additional level of protection for designated uses.

## **Benthic TMDL Development for the Upper Blackwater River Watershed**

### **4.1.6 Groundwater**

Agriculture and septic systems are two major sources that enrich the groundwater. Phosphorus concentrations in groundwater were based on the results from a nationwide study of mean dissolved nutrients as measured in streamflow (as reported in Haith et al. 1992). The relative percentage of agriculture and forest land in each watershed and septic population data were used to estimate groundwater phosphorus concentrations from the study results

### **4.2 Assessment of Point Sources**

Point sources can contribute sediment and phosphorus loads to surface waters through effluent discharges. These facilities are permitted through the Virginia Pollutant Discharge Elimination System (VPDES) program that is managed by VADEQ. VPDES individual permits are issued to facilities that must comply with permit conditions that include specific discharge limits.

There are three point source discharges located in the Upper Blackwater River watershed that potentially contribute sediment and phosphorus loads to the streams (Table 4.3). There is one VPDES individual permit, Callaway Elementary School (VA0088561), which is located on the South Fork Blackwater River. A permitted TSS concentration of 30 mg/L and a design flow of 0.0019 million gallons/day was used to calculate the sediment contribution from this point source.

General permits are granted for smaller facilities that must comply with a standard set of permit conditions, depending on facility type. Clover Meadow Dairy Farm (VPG120013) and VDOT-Franklin County (VAR101262) are subject to general permit standards. The Clover Meadow Dairy Farm is a confined animal feeding operation (CAFO) general permit which means that it is a no discharge facility. Rather, the loads from the lands governed by this permit have been taken into account by the model and are included in the load allocation. The VDOT-Franklin County facility was issued a stormwater construction permit which includes a limit of 100 mg/L for sediment. The load from this facility was calculated as the average annual modeled runoff in the area times the area governed by the permit (8.73 acres) times the maximum TSS concentration of 100 mg/L. Annual pollutant contributions by each facility are listed in Table 4.

**Table 1. VPDES point source facilities in the Upper Blackwater River watershed**

Stream	Facility Name	VPDES Permit No.	Discharge Type	Design Flow (MGD)	Permitted Concentration (mg/L)	TSS Load (metric tons/year)	Phosphorus Load (metric tons/year)
South Fork Blackwater	Callaway Elementary	VA0088561	Municipal	0.0019	30 TSS	0.0789	
North Fork Blackwater	Clover Meadow Dairy Farm	VPG120013	General - CAFO	N/A	N/A	N/A	N/A
Unnamed Tributary to South Fork Blackwater	VDOT-Franklin County	VAR101262*	General - Stormwater	0.0032	100 TSS	0.447	

\*Permitted load for this facility was calculated as the average annual modeled runoff times the area governed by the permit times a maximum TSS concentration of 100 mg/L. Flow was based on the average annual runoff from row crop lands.

Sediment and phosphorus loads are primarily contributed by nonpoint sources in the Upper Blackwater River watershed. The major nonpoint source of sediment and phosphorus in this watershed is agricultural land. Agricultural lands can contribute excessive sediment and phosphorus loads through erosion and build-up/washoff processes. Agricultural lands are particularly susceptible to erosion, which contributes sediment and adsorbed phosphorus loads. Phosphorus is also associated with the land-application of animal waste and failing septic systems.

## Modeling

TMDLs were developed using BasinSim 1.0 and the GWLF model. GWLF is a continuous-simulation model that uses daily time steps for weather data and water balance calculations. Monthly calculations are made for sediment and nutrient loads, based on daily water balance totals that are summed to give monthly values. In order to consider the spatial distribution of sources in the TMDL development, the Upper Blackwater River watershed was divided into 13 subbasins. Using a stream routing and transport module developed by Tetra Tech, the flow and pollutant loadings from each subwatershed are routed through the stream networks. The transport module also has the capability of assessing streambank erosion. The GWLF simulation results, including flow, sediment load, and phosphorus load (North Fork), for each subwatershed are used to drive the stream flow routing, sediment transport, as well as streambank erosion simulation.

Daily streamflow data are needed to calibrate watershed hydrologic parameters in the GWLF model. The USGS streamflow gage (02056900), located near Rocky Mount, was used in a paired watershed approach to calibrate hydrology for both the reference watershed (Big Chestnut Creek) and the impaired watershed (Upper Blackwater River). Flow data were available from this gage for the calibration period: January 1, 1991 - September 30, 1998. The calibration period covered a range

of hydrologic conditions, including low- and high-flow conditions as well as seasonal variations. The calibrated GWLF model adequately simulated the hydrology of the impaired watershed.

TMDL development requires the identification of impairment causes and the establishment of numeric endpoints that will allow for the attainment of designated uses and water quality criteria. Numeric endpoints represent the water quality goals that are to be achieved by implementing the load reductions specified in the TMDL. Virginia does not currently have numeric criteria for nutrients (i.e. total phosphorus and total nitrogen), sediment, and other parameters that may be contributing to the impaired condition of the benthic community in these streams. Therefore, a reference watershed approach was used to determine the primary benthic community stressors and to establish numeric endpoints for these stressors. This approach is based on selecting a non-impaired watershed that shares similar land use, ecoregion, and geomorphological characteristics with the impaired watershed. Stream conditions in the reference watershed are assumed to be representative of the conditions needed for the impaired stream to attain its designated uses. Big Chestnut Creek was chosen as the reference watershed and any reductions of sediment and phosphorus from the impaired waterbodies were based on the reference loads of sediment and phosphorus in the Big Chestnut Creek watershed.

### **Existing Conditions**

Impaired and reference watershed models were calibrated for hydrology using different modeling periods and weather input files. To establish baseline (reference watershed) loadings for sediment and phosphorus the GWLF model for Big Chestnut Creek was used. For TMDL calculation both the calibrated reference and impaired watersheds were modeled for a 12 and a half year period from 4/1/1990 to 12/31/2002. This was done to standardize the modeling period. In addition, the total area for the reference watershed was reduced to be equal to its paired target watershed. This was necessary because watershed size influences sediment delivery to the stream and other model variables.

The 12-year means for pollutants of concern were determined for each land use/source category in the reference and the impaired watershed. This modeling period was used, after calibration, to represent a broad range of recent weather and hydrologic conditions.

### **Margin of Safety**

While developing allocation scenarios for the TMDL, an explicit margin of safety (MOS) of ten percent was used. Ten percent of the reference sediment load was calculated and added to the sum of the load allocation (LA) and wasteload allocation (WLA) to produce the TMDL. It is assumed that a MOS of 10% will account for any uncertainty in the data and the computational methodology used for the analysis, as well as provide an additional level of protection for designated uses.

## **Benthic TMDL Development for the Upper Blackwater River Watershed**

### **3.8 Summary**

Water quality and habitat data indicate that excessive sedimentation is a primary cause of the listed benthic community impairments in the Upper Blackwater River and North Fork Blackwater River. Low DO conditions in the North Fork Blackwater River also likely contribute to the listed impairment for this stream. DO levels in the Upper Blackwater River segment were above established water quality criteria, although these data were somewhat depressed. Excessive nutrient inputs are believed to be responsible for the low dissolved oxygen levels measured during the diel DO monitoring study. N:P ratios identify phosphorus as the limiting nutrient that controls algal growth and the corresponding reduction in DO levels during summer, low flow periods. Ammonia levels were also high for the North Fork Blackwater and Blackwater mainstem; however, the ammonia chronic criteria was only exceeded on one occasion at one station. In addition, EPA toxicity test results indicate the need for additional toxic monitoring and follow-up investigation to determine the likelihood of toxic pollutant effects on the benthic community.

As a result of this study, sediment TMDLs were developed for the Upper Blackwater River and North Fork Blackwater River and a phosphorus TMDL was developed for the North Fork Blackwater River. BMP practices employed during implementation of these TMDLs and the previously developed bacteria TMDLs will help alleviate other possible benthic community stressors including ammonia toxicity and other factors.

### **4.1.6 Groundwater**

Agriculture and septic systems are two major sources that enrich the groundwater. Phosphorus concentrations in groundwater were based on the results from a nationwide study of mean dissolved nutrients as measured in streamflow (as reported in Haith et al. 1992). The relative percentage of agriculture and forest land in each watershed and septic population data were used to estimate groundwater phosphorus concentrations from the study results

### **4.2 Assessment of Point Sources**

Point sources can contribute sediment and phosphorus loads to surface waters through effluent discharges. These facilities are permitted through the Virginia Pollutant Discharge Elimination System (VPDES) program that is managed by VADEQ. VPDES individual permits are issued to facilities that must comply with permit conditions that include specific discharge limits.

There are three point source discharges located in the Upper Blackwater River watershed that potentially contribute sediment and phosphorus loads to the streams (Table 4.3). There is one VPDES individual permit, Callaway Elementary School (VA0088561), which is located on the South Fork Blackwater River. A permitted TSS concentration of 30 mg/L and a design flow of 0.0019 million gallons/day was used to calculate the sediment contribution from this point source.

General permits are granted for smaller facilities that must comply with a standard set of permit conditions, depending on facility type. Clover Meadow Dairy Farm (VPG120013) and VDOT-Franklin County (VAR101262) are subject to general permit standards. The Clover Meadow Dairy Farm is a confined animal feeding operation (CAFO) general permit which means that it is a no discharge facility. Rather, the loads from the lands governed by this permit have been taken into account by the model and are included in the load allocation. The VDOT-Franklin County facility was issued a stormwater construction permit which includes a limit of 100 mg/L for sediment. The load from this facility was calculated as the average annual modeled runoff in the area times the area governed by the permit (8.73 acres) times the maximum TSS concentration of 100 mg/L. Annual pollutant contributions by each facility are listed in Table 4.

## Benthic TMDL Development for the Upper Blackwater River Watershed

**Table 4.2 VPDES point source loads for TSS and total phosphorus**

Stream	Facility Name	VPDES Permit No.	Discharge Type	Design Flow (MGD)	Permitted Concentration (mg/L)	TSS Load (metric tons/year)	Phosphorus Load (metric tons/year)
South Fork Blackwater	Callaway Elementary	VA0088561	Municipal	0.0019	30 TSS	0.0789	
North Fork Blackwater	Clover Meadow Dairy Farm	VPG120013	General	N/A	N/A	N/A	N/A
Unnamed Tributary to South Fork Blackwater	VDOT-Franklin County	VAR101262*	General	0.0032	100 TSS	0.447	

\*Permitted load for this facility was calculated as the average annual modeled runoff times the area governed by the permit times a maximum TSS concentration of 100 mg/L. Flow was based on the average annual runoff from row crop lands.

### **6.2 Waste Load Allocation**

Waste load allocations were assigned to each point source facility in the watersheds. Point sources were represented by their current permit conditions and no reductions were required from point sources in the TMDL. Current permit requirements are expected to result in attainment of the WLAs as required by the TMDL. Point source contributions, even in terms of maximum flow, are minimal. Therefore, no reasonable potential exists for these facilities to have a negative impact on water quality and there is no reason to modify the existing permits. The WLA values presented in Tables 6.4, 6.5, and 6.6, represent the sum of all point source WLAs in the watershed. Note that the sediment load contributed by the VDOT facility (general stormwater permit #VAR101262) was calculated based on the area governed by the permit. This load was subtracted from the load allocation calculated for the "Pasture/Hay" source category, so as not to double-count the sediment contribution from this facility.

### **6.3 Load Allocation**

Load allocations were assigned to each source category in the watersheds. The recommended scenarios for Blackwater River (Tables 6.1 through 6.3) are based on maintaining the existing percent load contribution from each source category. The recommended scenario balances the reductions from agricultural and urban sources by maintaining existing watershed loading characteristics. The loadings from source categories were allocated according to their existing loads distribution. For instance, sediment loads from forest lands represent the natural condition that would be expected to exist; therefore, the loading from forest lands was not reduced.

### **6.4 Consideration of Critical Conditions**

The GWLF model is a continuous-simulation model that uses daily time steps for weather data and water balance calculations. Monthly calculations are made for sediment and nutrient loads, based on the daily water balance accumulated to monthly values. Therefore, all flow conditions are taken into account for loading calculations. Because there is usually a significant lag time between the introduction of sediment to a waterbody and the resulting impact on beneficial uses, establishing these TMDLs using average annual conditions is protective of the waterbody.

### **6.5 Consideration of Seasonal Variations**

The continuous-simulation model used for this analysis considers seasonal variation through a number of mechanisms. Daily time steps are used for weather data and water balance calculations. The model requires specification of the growing season and hours of daylight for each month. The combination of these model features accounts for seasonal variability.

## **Attachment F**

### **Wasteload and Limit Calculations**

- **Mixing Zone Calculations (MIXER 2.1)**
- **Effluent Data (pH, N, P, *E. coli*)**
- **Antidegradation Wasteload Allocation Spreadsheet**
- **STATS Program Outputs (ammonia, TRC)**

## Mixing Zone Predictions for

## Callaway Elementary School WWTP

Effluent Flow = 0.0019 MGD  
Stream 7Q10 = 1.57 MGD  
Stream 30Q10 = 2.55 MGD  
Stream 1Q10 = 1.33 MGD  
Stream slope = 0.005 ft/ft  
Stream width = 15 ft  
Bottom scale = 3  
Channel scale = 1

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### Mixing Zone Predictions @ 7Q10

Depth = .3509 ft  
Length = 498.7 ft  
Velocity = .4622 ft/sec  
Residence Time = .0125 days

#### Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

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### Mixing Zone Predictions @ 30Q10

Depth = .471 ft  
Length = 386.97 ft  
Velocity = .5577 ft/sec  
Residence Time = .008 days

#### Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

---

### Mixing Zone Predictions @ 1Q10

Depth = .3172 ft  
Length = 544.15 ft  
Velocity = .4333 ft/sec  
Residence Time = .3488 hours

#### Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

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**Effluent pH Data (S.U.)**

Date	Minimum	Maximum
10-Nov-10	6.9	7.2
10-Dec-10	6.9	7.2
10-Jan-11	6.9	7.1
10-Feb-11	6.9	7.1
10-Mar-11	6.9	7.1
10-Apr-11	6.9	7.1
10-May-11	6.9	7.1
10-Jun-11	6.9	7.3
10-Jul-11	7	7.1
10-Aug-11	7	7
10-Sep-11	7	7.1
10-Oct-11	7	7.1
10-Nov-11	7	7.1
10-Dec-11	7	7.1
10-Jan-12	7	7.1
10-Feb-12	7	7.1
10-Mar-12	7	7.1
10-Apr-12	7	7.1
10-May-12	6.8	7.1
10-Jun-12	7	7
10-Jul-12	7	7
10-Aug-12	7	7
10-Sep-12	7	7
10-Oct-12	7	7.3
10-Nov-12	7	7.3
10-Dec-12	7	7.3
10-Jan-13	7	7.2
10-Feb-13	7	7.2
10-Mar-13	7	7.2
10-Apr-13	7	7.2
10-May-13	7	7.2
10-Jun-13	7	7.2
10-Jul-13	7	7.2
10-Sep-13	7	7.1
10-Oct-13	7	7.1
10-Nov-13	7	7.1
10-Dec-13	7	7.1
10-Jan-14	7	7
10-Feb-14	7	7
10-Mar-14	7	7.1
10-Apr-14	7	7.1
10-May-14	7	7.1
10-Jun-14	7	7.1
10-Sep-14	7	7.1
10-Oct-14	7	7.2
10-Nov-14	7	7.1
10-Dec-14	7	7
10-Jan-15	7	7
10-Feb-15	7	7

90th Percentile pH

7.2 S.U.

10th Percentile pH

6.9 S.U.

**Effluent Nutrient Monitoring**

Date	P, Total mg/L	N, total mg/L
10-Oct-05	5.97	31.6
10-Nov-05	7.75	37.7
10-Dec-05	9.54	56.2
10-Jan-06	4.26	52.6
10-Feb-06	3.74	42.4
10-Mar-06	2.82	49.1
10-Apr-06	8.15	60.9
10-May-06	12.8	56.3
10-Jun-06	8.37	51.4
10-Jul-06	4.04	49.5
10-Aug-06	6.76	32.9
10-Sep-06	4.6	10.6
10-Oct-06	6.1	41.8
10-Nov-06	9.53	24.1
10-Dec-06	8.6	38.7
10-Jan-07	10	48.1
10-Feb-07	9.26	63.2
10-Mar-07	10.6	45.5
10-Apr-07	11.2	63.7
10-May-07	7.98	54.7
10-Jun-07	15.6	59.7
10-Jul-07	14.4	28.8
10-Aug-07	5.18	44.7
10-Sep-07	5.41	55.1
10-Oct-07	3	32.7
10-Nov-07	9.05	27.2
10-Dec-07	6.15	30.3
10-Jan-08	13.8	42.9
10-Feb-08	4.06	25.7
10-Mar-08	8.79	45.8
10-Apr-08	7.17	66.9
10-May-08	9.03	42.05
10-Jun-08	9.09	48.85
10-Jul-08	8.1	67.8
10-Aug-08	<QL	38.6
10-Sep-08	4.65	41.7
10-Oct-08	6.98	38.9
10-Nov-08	13.04	48.2
10-Dec-08	10.26	63.38
10-Jan-09	7.36	55.9
10-Feb-09	11.21	47.3
10-Mar-09	5.64	57.33
10-Apr-09	10.29	65.15
10-May-09	14.75	76.2
10-Jun-09	9.32	38.65

Mean P	7.50	mg/L
Max P	15.6	mg/L
Min P	<QL	mg/L

Mean N	42.65	mg/L
Max N	76.2	mg/L
Min N	6.51	mg/L

Callaway Elementary School WWTP  
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**Effluent Nutrient Monitoring**

Date	P, Total mg/L	N, total mg/L
10-Jul-09	9.68	35.46
10-Aug-09	4.27	25.39
10-Sep-09	1.3	6.51
10-Oct-09	5.82	31.04
10-Nov-09	4.24	29.27
10-Dec-09	11.89	44.45
10-Jan-10	4.79	19.21
10-Feb-10	2.7	25.2
10-Mar-10	1.5	12.3
10-Apr-10	1.9	15.9

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*E. coli*

Date	cfu/100 mL
10-Nov-10	5.1
10-Dec-10	3.4
10-Jan-11	7.9
10-Feb-11	6.32
10-Mar-11	6.3
10-Apr-11	<2.0
10-May-11	<1.0
10-Jun-11	5.5
10-Jul-11	1
10-Aug-11	5.4
10-Sep-11	<2.0
10-Oct-11	<2.0
10-Nov-11	>2.0
10-Dec-11	<2.0
10-Jan-12	<2.0
10-Feb-12	<2.0
10-Mar-12	1.4
10-Apr-12	2.3
10-May-12	<2.0
10-Jun-12	2
10-Jul-12	<2.0
10-Aug-12	7
10-Sep-12	<2.0
10-Oct-12	<2.0
10-Nov-12	9
10-Dec-12	8
10-Jan-13	2
10-Feb-13	2
10-Mar-13	1
10-Apr-13	1
10-May-13	2
10-Jun-13	2
10-Jul-13	2
10-Sep-13	2
10-Oct-13	1
10-Nov-13	1
10-Dec-13	2
10-Jan-14	2
10-Feb-14	6
10-Mar-14	3
10-Apr-14	2
10-May-14	1
10-Jun-14	1
10-Sep-14	1
10-Oct-14	1
10-Nov-14	1
10-Dec-14	1
10-Jan-15	1
10-Feb-15	1

# FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Callaway Elementary School WWTP

Permit No.: VA0088561

Receiving Stream: Blackwater River, South Fork

Version: OWP Guidance Memo 00-2011 (8/24/00)

## Stream Information

Mean Hardness (as CaCO3) =	25 mg/L
90% Temperature (Annual) =	21.5 deg C
90% Temperature (Wet season) =	17.2 deg C
90% Maximum pH =	8.1 SU
10% Maximum pH =	7 SU
Tier Designation (1 or 2) =	2
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	y
Early Life Stages Present Y/N? =	y

## Stream Flows

1Q10 (Annual) =	1.33 MGD
7Q10 (Annual) =	1.57 MGD
30Q10 (Annual) =	2.55 MGD
1Q10 (Wet season) =	5.48 MGD
30Q10 (Wet season) =	2.55 MGD
30Q5 =	3.64 MGD
Harmonic Mean =	11.17 MGD

## Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

## Effluent Information

Mean Hardness (as CaCO3) =	25 mg/L
90% Temp (Annual) =	21.5 deg C
90% Temp (Wet season) =	17.2 deg C
90% Maximum pH =	7.2 SU
10% Maximum pH =	6.9 SU
Discharge Flow =	0.0019 MGD

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenaphthene	0	--	--	na	9.9E+02	--	--	na	1.9E+06	--	--	na	9.9E+01	--	--	na	1.9E+05	--	--	na	1.9E+05
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.8E+04	--	--	na	9.3E-01	--	--	na	1.8E+03	--	--	na	1.8E+03
Acrylonitrile <sup>C</sup>	0	--	--	na	2.5E+00	--	--	na	1.5E+04	--	--	na	2.5E-01	--	--	na	1.5E+03	--	--	na	1.5E+03
Aldrin <sup>C</sup>	0	3.0E+00	--	na	5.0E-04	2.1E+03	--	na	2.9E+00	7.5E-01	--	na	5.0E-05	5.3E+02	--	na	2.9E-01	5.3E+02	--	na	2.9E-01
Ammonia-N (mg/l) (Yearly)	0	4.68E+00	1.34E+00	na	--	3.3E+03	1.8E+03	na	--	1.17E+00	3.35E-01	na	--	8.2E+02	4.5E+02	na	--	8.2E+02	4.5E+02	na	--
Ammonia-N (mg/l) (High Flow)	0	4.65E+00	1.77E+00	na	--	1.3E+04	2.4E+03	na	--	1.16E+00	4.43E-01	na	--	3.4E+03	5.9E+02	na	--	3.4E+03	5.9E+02	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	7.7E+07	--	--	na	4.0E+03	--	--	na	7.7E+06	--	--	na	7.7E+06
Antimony	0	--	--	na	6.4E+02	--	--	na	1.2E+06	--	--	na	6.4E+01	--	--	na	1.2E+05	--	--	na	1.2E+05
Arsenic	0	3.4E+02	1.5E+02	na	--	2.4E+05	1.2E+05	na	--	8.5E+01	3.8E+01	na	--	6.0E+04	3.1E+04	na	--	6.0E+04	3.1E+04	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Benzene <sup>C</sup>	0	--	--	na	5.1E+02	--	--	na	3.0E+06	--	--	na	5.1E+01	--	--	na	3.0E+05	--	--	na	3.0E+05
Benzidine <sup>C</sup>	0	--	--	na	2.0E-03	--	--	na	1.2E+01	--	--	na	2.0E-04	--	--	na	1.2E+00	--	--	na	1.2E+00
Benzo (a) anthracene <sup>C</sup>	0	--	--	na	1.8E-01	--	--	na	1.1E+03	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.1E+02
Benzo (b) fluoranthene <sup>C</sup>	0	--	--	na	1.8E-01	--	--	na	1.1E+03	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.1E+02
Benzo (k) fluoranthene <sup>C</sup>	0	--	--	na	1.8E-01	--	--	na	1.1E+03	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.1E+02
Benzo (a) pyrene <sup>C</sup>	0	--	--	na	1.8E-01	--	--	na	1.1E+03	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.1E+02
Bis(2-Chloroethyl) Ether <sup>C</sup>	0	--	--	na	5.3E+00	--	--	na	3.1E+04	--	--	na	5.3E-01	--	--	na	3.1E+03	--	--	na	3.1E+03
Bis(2-Chloroisopropyl) Ether	0	--	--	na	6.5E+04	--	--	na	1.2E+08	--	--	na	6.5E+03	--	--	na	1.2E+07	--	--	na	1.2E+07
Bis 2-Ethylhexyl Phthalate <sup>C</sup>	0	--	--	na	2.2E+01	--	--	na	1.3E+05	--	--	na	2.2E+00	--	--	na	1.3E+04	--	--	na	1.3E+04
Bromoform <sup>C</sup>	0	--	--	na	1.4E+03	--	--	na	8.2E+06	--	--	na	1.4E+02	--	--	na	8.2E+05	--	--	na	8.2E+05
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.6E+06	--	--	na	1.9E+02	--	--	na	3.6E+05	--	--	na	3.6E+05
Cadmium	0	8.2E-01	3.8E-01	na	--	5.8E+02	3.2E+02	na	--	2.1E-01	9.5E-02	na	--	1.4E+02	7.9E+01	na	--	1.4E+02	7.9E+01	na	--
Carbon Tetrachloride <sup>C</sup>	0	--	--	na	1.6E+01	--	--	na	9.4E+04	--	--	na	1.6E+00	--	--	na	9.4E+03	--	--	na	9.4E+03
Chlordane <sup>C</sup>	0	2.4E+00	4.3E-03	na	8.1E-03	1.7E+03	3.6E+00	na	4.8E+01	6.0E-01	1.1E-03	na	8.1E-04	4.2E+02	8.9E-01	na	4.8E+00	4.2E+02	8.9E-01	na	4.8E+00
Chloride	0	8.6E+05	2.3E+05	na	--	6.0E+08	1.9E+08	na	--	2.2E+05	5.8E+04	na	--	1.5E+08	4.8E+07	na	--	1.5E+08	4.8E+07	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.3E+04	9.1E+03	na	--	4.8E+00	2.8E+00	na	--	3.3E+03	2.3E+03	na	--	3.3E+03	2.3E+03	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	3.1E+06	--	--	na	1.6E+02	--	--	na	3.1E+05	--	--	na	3.1E+05

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane <sup>C</sup>	0	--	--	na	1.3E+02	--	--	na	7.6E+05	--	--	na	1.3E+01	--	--	na	7.6E+04	--	--	na	7.6E+04
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.1E+07	--	--	na	1.1E+03	--	--	na	2.1E+06	--	--	na	2.1E+06
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.1E+06	--	--	na	1.6E+02	--	--	na	3.1E+05	--	--	na	3.1E+05
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.9E+05	--	--	na	1.5E+01	--	--	na	2.9E+04	--	--	na	2.9E+04
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	5.8E+01	3.4E+01	na	--	2.1E-02	1.0E-02	na	--	1.5E+01	8.5E+00	na	--	1.5E+01	8.5E+00	na	--
Chromium III	0	1.8E+02	2.4E+01	na	--	1.3E+05	2.0E+04	na	--	4.6E+01	6.0E+00	na	--	3.2E+04	4.9E+03	na	--	3.2E+04	4.9E+03	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.1E+04	9.1E+03	na	--	4.0E+00	2.8E+00	na	--	2.8E+03	2.3E+03	na	--	2.8E+03	2.3E+03	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.9E+04	--	--	--	na	--
Chrysene <sup>C</sup>	0	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.8E-03	--	--	na	1.1E+01	--	--	na	1.1E+01
Copper	0	3.6E+00	2.7E+00	na	--	2.6E+03	2.3E+03	na	--	9.1E-01	6.8E-01	na	--	6.4E+02	5.7E+02	na	--	6.4E+02	5.7E+02	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	1.5E+04	4.3E+03	na	3.1E+07	5.5E+00	1.3E+00	na	1.6E+03	3.9E+03	1.1E+03	na	3.1E+06	3.9E+03	1.1E+03	na	3.1E+06
DDD <sup>C</sup>	0	--	--	na	3.1E-03	--	--	na	1.8E+01	--	--	na	3.1E-04	--	--	na	1.8E+00	--	--	na	1.8E+00
DDE <sup>C</sup>	0	--	--	na	2.2E-03	--	--	na	1.3E+01	--	--	na	2.2E-04	--	--	na	1.3E+00	--	--	na	1.3E+00
DDT <sup>C</sup>	0	1.1E+00	1.0E-03	na	2.2E-03	7.7E+02	8.3E-01	na	1.3E+01	2.8E-01	2.5E-04	na	2.2E-04	1.9E+02	2.1E-01	na	1.3E+00	1.9E+02	2.1E-01	na	1.3E+00
Demeton	0	--	1.0E-01	na	--	--	8.3E+01	na	--	--	2.5E-02	na	--	--	2.1E+01	na	--	--	2.1E+01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.2E+02	1.4E+02	na	--	4.3E-02	4.3E-02	na	--	3.0E+01	3.5E+01	na	--	3.0E+01	3.5E+01	na	--
Dibenz(a,h)anthracene <sup>C</sup>	0	--	--	na	1.8E-01	--	--	na	1.1E+03	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.1E+02
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.5E+06	--	--	na	1.3E+02	--	--	na	2.5E+05	--	--	na	2.5E+05
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.8E+06	--	--	na	9.6E+01	--	--	na	1.8E+05	--	--	na	1.8E+05
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.6E+05	--	--	na	1.9E+01	--	--	na	3.6E+04	--	--	na	3.6E+04
3,3-Dichlorobenzidine <sup>C</sup>	0	--	--	na	2.8E-01	--	--	na	1.6E+03	--	--	na	2.8E-02	--	--	na	1.6E+02	--	--	na	1.6E+02
Dichlorobromomethane <sup>C</sup>	0	--	--	na	1.7E+02	--	--	na	1.0E+06	--	--	na	1.7E+01	--	--	na	1.0E+05	--	--	na	1.0E+05
1,2-Dichloroethane <sup>C</sup>	0	--	--	na	3.7E+02	--	--	na	2.2E+06	--	--	na	3.7E+01	--	--	na	2.2E+05	--	--	na	2.2E+05
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.4E+07	--	--	na	7.1E+02	--	--	na	1.4E+06	--	--	na	1.4E+06
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.9E+07	--	--	na	1.0E+03	--	--	na	1.9E+06	--	--	na	1.9E+06
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.6E+05	--	--	na	2.9E+01	--	--	na	5.6E+04	--	--	na	5.6E+04
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane <sup>C</sup>	0	--	--	na	1.5E+02	--	--	na	8.8E+05	--	--	na	1.5E+01	--	--	na	8.8E+04	--	--	na	8.8E+04
1,3-Dichloropropene <sup>C</sup>	0	--	--	na	2.1E+02	--	--	na	1.2E+06	--	--	na	2.1E+01	--	--	na	1.2E+05	--	--	na	1.2E+05
Dieldrin <sup>C</sup>	0	2.4E-01	5.6E-02	na	5.4E-04	1.7E+02	4.6E+01	na	3.2E+00	6.0E-02	1.4E-02	na	5.4E-05	4.2E+01	1.2E+01	na	3.2E-01	4.2E+01	1.2E+01	na	3.2E-01
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.4E+07	--	--	na	4.4E+03	--	--	na	8.4E+06	--	--	na	8.4E+06
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.6E+06	--	--	na	8.5E+01	--	--	na	1.6E+05	--	--	na	1.6E+05
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.1E+09	--	--	na	1.1E+05	--	--	na	2.1E+08	--	--	na	2.1E+08
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	8.6E+06	--	--	na	4.5E+02	--	--	na	8.6E+05	--	--	na	8.6E+05
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.0E+07	--	--	na	5.3E+02	--	--	na	1.0E+06	--	--	na	1.0E+06
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.4E+05	--	--	na	2.8E+01	--	--	na	5.4E+04	--	--	na	5.4E+04
2,4-Dinitrotoluene <sup>C</sup>	0	--	--	na	3.4E+01	--	--	na	2.0E+05	--	--	na	3.4E+00	--	--	na	2.0E+04	--	--	na	2.0E+04
Dioxin 2,3,7,8- tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	9.8E-05	--	--	na	5.1E-09	--	--	na	9.8E-06	--	--	na	9.8E-06
1,2-Diphenylhydrazine <sup>C</sup>	0	--	--	na	2.0E+00	--	--	na	1.2E+04	--	--	na	2.0E-01	--	--	na	1.2E+03	--	--	na	1.2E+03
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.5E+02	4.6E+01	na	1.7E+05	5.5E-02	1.4E-02	na	8.9E+00	3.9E+01	1.2E+01	na	1.7E+04	3.9E+01	1.2E+01	na	1.7E+04
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	1.5E+02	4.6E+01	na	1.7E+05	5.5E-02	1.4E-02	na	8.9E+00	3.9E+01	1.2E+01	na	1.7E+04	3.9E+01	1.2E+01	na	1.7E+04
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	1.5E+02	4.6E+01	--	--	5.5E-02	1.4E-02	--	--	3.9E+01	1.2E+01	--	--	3.9E+01	1.2E+01	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.7E+05	--	--	na	8.9E+00	--	--	na	1.7E+04	--	--	na	1.7E+04
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	6.0E+01	3.0E+01	na	1.2E+02	2.2E-02	9.0E-03	na	6.0E-03	1.5E+01	7.4E+00	na	1.2E+01	1.5E+01	7.4E+00	na	1.2E+01
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.8E+02	--	--	na	3.0E-02	--	--	na	5.8E+01	--	--	na	5.8E+01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	4.0E+06	--	--	na	2.1E+02	--	--	na	4.0E+05	--	--	na	4.0E+05
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.7E+05	--	--	na	1.4E+01	--	--	na	2.7E+04	--	--	na	2.7E+04
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.0E+07	--	--	na	5.3E+02	--	--	na	1.0E+06	--	--	na	1.0E+06
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	8.3E+00	na	--	--	2.5E-03	na	--	--	2.1E+00	na	--	--	2.1E+00	na	--
Heptachlor <sup>C</sup>	0	5.2E-01	3.8E-03	na	7.9E-04	3.6E+02	3.1E+00	na	4.6E+00	1.3E-01	9.5E-04	na	7.9E-05	9.1E+01	7.9E-01	na	4.6E-01	9.1E+01	7.9E-01	na	4.6E-01
Heptachlor Epoxide <sup>C</sup>	0	5.2E-01	3.8E-03	na	3.9E-04	3.6E+02	3.1E+00	na	2.3E+00	1.3E-01	9.5E-04	na	3.9E-05	9.1E+01	7.9E-01	na	2.3E-01	9.1E+01	7.9E-01	na	2.3E-01
Hexachlorobenzene <sup>C</sup>	0	--	--	na	2.9E-03	--	--	na	1.7E+01	--	--	na	2.9E-04	--	--	na	1.7E+00	--	--	na	1.7E+00
Hexachlorobutadiene <sup>C</sup>	0	--	--	na	1.8E+02	--	--	na	1.1E+06	--	--	na	1.8E+01	--	--	na	1.1E+05	--	--	na	1.1E+05
Hexachlorocyclohexane																					
Alpha-BHC <sup>C</sup>	0	--	--	na	4.9E-02	--	--	na	2.9E+02	--	--	na	4.9E-03	--	--	na	2.9E+01	--	--	na	2.9E+01
Hexachlorocyclohexane																					
Beta-BHC <sup>C</sup>	0	--	--	na	1.7E-01	--	--	na	1.0E+03	--	--	na	1.7E-02	--	--	na	1.0E+02	--	--	na	1.0E+02
Hexachlorocyclohexane																					
Gamma-BHC <sup>C</sup> (Lindane)	0	9.5E-01	na	na	1.8E+00	6.7E+02	--	na	1.1E+04	2.4E-01	--	na	1.8E-01	1.7E+02	--	na	1.1E+03	1.7E+02	--	na	1.1E+03
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.1E+06	--	--	na	1.1E+02	--	--	na	2.1E+05	--	--	na	2.1E+05
Hexachloroethane <sup>C</sup>	0	--	--	na	3.3E+01	--	--	na	1.9E+05	--	--	na	3.3E+00	--	--	na	1.9E+04	--	--	na	1.9E+04
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	1.7E+03	na	--	--	5.0E-01	na	--	--	4.1E+02	na	--	--	4.1E+02	na	--
Indeno (1,2,3-cd) pyrene <sup>C</sup>	0	--	--	na	1.8E-01	--	--	na	1.1E+03	--	--	na	1.8E-02	--	--	na	1.1E+02	--	--	na	1.1E+02
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone <sup>C</sup>	0	--	--	na	9.6E+03	--	--	na	5.6E+07	--	--	na	9.6E+02	--	--	na	5.6E+06	--	--	na	5.6E+06
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Lead	0	2.0E+01	2.3E+00	na	--	1.4E+04	1.9E+03	na	--	5.1E+00	5.8E-01	na	--	3.6E+03	4.8E+02	na	--	3.6E+03	4.8E+02	na	--
Malathion	0	--	1.0E-01	na	--	--	8.3E+01	na	--	--	2.5E-02	na	--	--	2.1E+01	na	--	--	2.1E+01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	9.8E+02	6.4E+02	--	--	3.5E-01	1.9E-01	--	--	2.5E+02	1.6E+02	--	--	2.5E+02	1.6E+02	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.9E+06	--	--	na	1.5E+02	--	--	na	2.9E+05	--	--	na	2.9E+05
Methylene Chloride <sup>C</sup>	0	--	--	na	5.9E+03	--	--	na	3.5E+07	--	--	na	5.9E+02	--	--	na	3.5E+06	--	--	na	3.5E+06
Methoxychlor	0	--	3.0E-02	na	--	--	2.5E+01	na	--	--	7.5E-03	na	--	--	6.2E+00	na	--	--	6.2E+00	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Nickel	0	5.6E+01	6.3E+00	na	4.6E+03	4.0E+04	5.2E+03	na	8.8E+06	1.4E+01	1.6E+00	na	4.6E+02	9.9E+03	1.3E+03	na	8.8E+05	9.9E+03	1.3E+03	na	8.8E+05
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.3E+06	--	--	na	6.9E+01	--	--	na	1.3E+05	--	--	na	1.3E+05
N-Nitrosodimethylamine <sup>C</sup>	0	--	--	na	3.0E+01	--	--	na	1.8E+05	--	--	na	3.0E+00	--	--	na	1.8E+04	--	--	na	1.8E+04
N-Nitrosodiphenylamine <sup>C</sup>	0	--	--	na	6.0E+01	--	--	na	3.5E+05	--	--	na	6.0E+00	--	--	na	3.5E+04	--	--	na	3.5E+04
N-Nitrosodi-n-propylamine <sup>C</sup>	0	--	--	na	5.1E+00	--	--	na	3.0E+04	--	--	na	5.1E-01	--	--	na	3.0E+03	--	--	na	3.0E+03
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.0E+04	5.5E+03	na	--	7.0E+00	1.7E+00	--	--	4.9E+03	1.4E+03	--	--	4.9E+03	1.4E+03	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	4.6E+01	1.1E+01	na	--	1.6E-02	3.3E-03	na	--	1.1E+01	2.7E+00	na	--	1.1E+01	2.7E+00	na	--
PCB Total <sup>C</sup>	0	--	1.4E-02	na	6.4E-04	--	1.2E+01	na	3.8E+00	--	3.5E-03	na	6.4E-05	--	2.9E+00	na	3.8E-01	--	2.9E+00	na	3.8E-01
Pentachlorophenol <sup>C</sup>	0	8.7E+00	6.7E+00	na	3.0E+01	6.1E+03	5.5E+03	na	1.8E+05	2.2E+00	1.7E+00	na	3.0E+00	1.5E+03	1.4E+03	na	1.8E+04	1.5E+03	1.4E+03	na	1.8E+04
Phenol	0	--	--	na	8.6E+05	--	--	na	1.6E+09	--	--	na	8.6E+04	--	--	na	1.6E+08	--	--	na	1.6E+08
Pyrene	0	--	--	na	4.0E+03	--	--	na	7.7E+06	--	--	na	4.0E+02	--	--	na	7.7E+05	--	--	na	7.7E+05
Radionuclides																					
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	7.7E+03	--	--	na	4.0E-01	--	--	na	7.7E+02	--	--	na	7.7E+02
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	1.4E+04	4.1E+03	na	8.1E+06	5.0E+00	1.3E+00	na	4.2E+02	3.5E+03	1.0E+03	na	8.1E+05	3.5E+03	1.0E+03	na	8.1E+05
Silver	0	3.2E-01	--	na	--	2.2E+02	--	na	--	7.9E-02	--	na	--	5.6E+01	--	na	--	5.6E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,1,2,2-Tetrachloroethane <sup>C</sup>	0	--	--	na	4.0E+01	--	--	na	2.4E+05	--	--	na	4.0E+00	--	--	na	2.4E+04	--	--	na	2.4E+04
Tetrachloroethylene <sup>C</sup>	0	--	--	na	3.3E+01	--	--	na	1.9E+05	--	--	na	3.3E+00	--	--	na	1.9E+04	--	--	na	1.9E+04
Thallium	0	--	--	na	4.7E-01	--	--	na	9.0E+02	--	--	na	4.7E-02	--	--	na	9.0E+01	--	--	na	9.0E+01
Toluene	0	--	--	na	6.0E+03	--	--	na	1.2E+07	--	--	na	6.0E+02	--	--	na	1.2E+06	--	--	na	1.2E+06
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Toxaphene <sup>C</sup>	0	7.3E-01	2.0E-04	na	2.8E-03	5.1E+02	1.7E-01	na	1.6E+01	1.8E-01	5.0E-05	na	2.8E-04	1.3E+02	4.1E-02	na	1.6E+00	1.3E+02	4.1E-02	na	1.6E+00
Tributyltin	0	4.6E-01	7.2E-02	na	--	3.2E+02	6.0E+01	na	--	1.2E-01	1.8E-02	na	--	8.1E+01	1.5E+01	na	--	8.1E+01	1.5E+01	na	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.3E+05	--	--	na	7.0E+00	--	--	na	1.3E+04	--	--	na	1.3E+04
1,1,2-Trichloroethane <sup>C</sup>	0	--	--	na	1.6E+02	--	--	na	9.4E+05	--	--	na	1.6E+01	--	--	na	9.4E+04	--	--	na	9.4E+04
Trichloroethylene <sup>C</sup>	0	--	--	na	3.0E+02	--	--	na	1.8E+06	--	--	na	3.0E+01	--	--	na	1.8E+05	--	--	na	1.8E+05
2,4,6-Trichlorophenol <sup>C</sup>	0	--	--	na	2.4E+01	--	--	na	1.4E+05	--	--	na	2.4E+00	--	--	na	1.4E+04	--	--	na	1.4E+04
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Vinyl Chloride <sup>C</sup>	0	--	--	na	2.4E+01	--	--	na	1.4E+05	--	--	na	2.4E+00	--	--	na	1.4E+04	--	--	na	1.4E+04
Zinc	0	3.6E+01	3.6E+01	na	2.6E+04	2.5E+04	3.0E+04	na	5.0E+07	9.1E+00	9.1E+00	na	2.6E+03	6.3E+03	7.5E+03	na	5.0E+06	6.3E+03	7.5E+03	na	5.0E+06

**Notes:**

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.  
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline =  $(0.25(\text{WQC} - \text{background conc.}) + \text{background conc.})$  for acute and chronic  
=  $(0.1(\text{WQC} - \text{background conc.}) + \text{background conc.})$  for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.2E+05
Arsenic	1.9E+04
Barium	na
Cadmium	4.7E+01
Chromium III	3.0E+03
Chromium VI	1.1E+03
Copper	2.6E+02
Iron	na
Lead	2.9E+02
Manganese	na
Mercury	9.6E+01
Nickel	7.8E+02
Selenium	6.2E+02
Silver	2.2E+01
Zinc	2.5E+03

Note: do not use QL's lower than the minimum QL's provided in agency guidance

**0.002 MGD DISCHARGE FLOW - STREAM MIX PER "Mix.exe"**

Discharge Flow Used for WQS-WLA Calculations (MGD) 0.002					<b><u>Ammonia - Dry Season - Acute</u></b>		<b><u>Ammonia - Dry Season - Chronic</u></b>	
Stream Flows		Total Mix Flows			90th Percentile pH (SU)	8.096	90th Percentile Temp. (deg C)	21.500
<u>Allocated to Mix (MGD)</u>		<u>Stream + Discharge (MGD)</u>			(7.204 - pH)	-0.892	90th Percentile pH (SU)	8.098
<u>Dry Season</u>	<u>Wet Season</u>	<u>Dry Season</u>	<u>Wet Season</u>		(pH - 7.204)	0.892	MIN	1.817
1Q10	1.330	5.480	1.332	5.482	Trout Present Criterion (mg N/l	4.679	MAX	21.500
7Q10	1.570	N/A	1.572	N/A	Trout Absent Criterion (mg N/L	7.006	(7.688 - pH)	-0.410
30Q10	2.550	2.550	2.552	2.552	Trout Present?	y	(pH - 7.688)	0.410
30Q5	3.640	N/A	3.642	N/A	Effective Criterion (mg N/L)	4.679	Early LS Present Criterion (mg N	1.342
Harm. Mean	11.170	N/A	11.172	N/A			Early LS Absent Criterion (mg N/	1.342
Annual Avg.	0.000	N/A	0.002	N/A			Early Life Stages Present?	y
<b><u>Stream/Discharge Mix Values</u></b>							Effective Criterion (mg N/L)	1.342
		<u>Dry Season</u>	<u>Wet Season</u>		<b><u>Ammonia - Wet Season - Acute</u></b>		<b><u>Ammonia - Wet Season - Chronic</u></b>	
1Q10 90th% Temp. Mix (deg C)		21.500	17.200		90th Percentile pH (SU)	8.099	90th Percentile Temp. (deg C)	17.200
30Q10 90th% Temp. Mix (deg C)		21.500	17.200		(7.204 - pH)	-0.895	90th Percentile pH (SU)	8.098
1Q10 90th% pH Mix (SU)		8.096	8.099		(pH - 7.204)	0.895	MIN	2.398
30Q10 90th% pH Mix (SU)		8.098	8.098		Trout Present Criterion (mg N/l	4.650	MAX	17.200
1Q10 10th% pH Mix (SU)		7.000	N/A		Trout Absent Criterion (mg N/L	6.962	(7.688 - pH)	-0.410
7Q10 10th% pH Mix (SU)		7.000	N/A		Trout Present?	y	(pH - 7.688)	0.410
		<u>Calculated</u>	<u>Formula Inputs</u>		Effective Criterion (mg N/L)	4.650	Early LS Present Criterion (mg N	1.770
1Q10 Hardness (mg/L as CaCO3)		25.0	25.0				Early LS Absent Criterion (mg N/	1.770
7Q10 Hardness (mg/L as CaCO3)		25.0	25.0				Early Life Stages Present?	y
							Effective Criterion (mg N/L)	1.770

**0.002 MGD DISCHARGE FLOW - COMPLETE STREAM MIX**

Discharge Flow Used for WQS-WLA Calculations (MGD)					0.002		<u>Ammonia - Dry Season - Acute</u>		<u>Ammonia - Dry Season - Chronic</u>	
100% Stream Flows		Total Mix Flows				90th Percentile pH (SU)	8.096	90th Percentile Temp. (deg C)	21.500	
<u>Allocated to Mix (MGD)</u>		<u>Stream + Discharge (MGD)</u>				(7.204 - pH)	-0.892	90th Percentile pH (SU)	8.098	
	<u>Dry Season</u>	<u>Wet Season</u>	<u>Dry Season</u>	<u>Wet Season</u>	(pH - 7.204)	0.892	MIN	1.817		
1Q10	1.330	5.480	1.332	5.482	Trout Present Criterion (mg N/l	4.679	MAX	21.500		
7Q10	1.570	N/A	1.572	N/A	Trout Absent Criterion (mg N/L	7.006	(7.688 - pH)	-0.410		
30Q10	2.550	2.550	2.552	2.552	Trout Present?	y	(pH - 7.688)	0.410		
30Q5	3.640	N/A	3.642	N/A	Effective Criterion (mg N/L)	4.679	Early LS Present Criterion (mg N	1.342		
Harm. Mean	11.170	N/A	11.172	N/A			Early LS Absent Criterion (mg N/	1.342		
Annual Avg.	0.000	N/A	0.002	N/A			Early Life Stages Present?	y		
<u>Stream/Discharge Mix Values</u>							Effective Criterion (mg N/L)	1.342		
			<u>Dry Season</u>	<u>Wet Season</u>	<u>Ammonia - Wet Season - Acute</u>		<u>Ammonia - Wet Season - Chronic</u>			
1Q10 90th% Temp. Mix (deg C)			21.500	17.200	90th Percentile pH (SU)	8.099	90th Percentile Temp. (deg C)	17.200		
30Q10 90th% Temp. Mix (deg C)			21.500	17.200	(7.204 - pH)	-0.895	90th Percentile pH (SU)	8.098		
1Q10 90th% pH Mix (SU)			8.096	8.099	(pH - 7.204)	0.895	MIN	2.398		
30Q10 90th% pH Mix (SU)			8.098	8.098	Trout Present Criterion (mg N/l	4.650	MAX	17.200		
1Q10 10th% pH Mix (SU)			7.000	N/A	Trout Absent Criterion (mg N/L	6.962	(7.688 - pH)	-0.410		
7Q10 10th% pH Mix (SU)			7.000	N/A	Trout Present?	y	(pH - 7.688)	0.410		
			Calculated	Formula Inputs	Effective Criterion (mg N/L)	4.650	Early LS Present Criterion (mg N	1.770		
1Q10 Hardness (mg/L as CaCO3) =			25.000	25.000			Early LS Absent Criterion (mg N/	1.770		
7Q10 Hardness (mg/L as CaCO3) =			25.000	25.000			Early Life Stages Present?	y		
							Effective Criterion (mg N/L)	1.770		

4/23/2015 10:14:49 AM

Facility = Callaway Elementary School WWTP

Chemical = ammonia (mg/L)

Chronic averaging period = 30

WLAa = 3300

WLAc =

Q.L. = 0.2

# samples/mo. = 1

# samples/wk. = 1

#### Summary of Statistics:

# observations = 1

Expected Value = 9

Variance = 29.16

C.V. = 0.6

97th percentile daily values = 21.9007

97th percentile 4 day average = 14.9741

97th percentile 30 day average = 10.8544

# < Q.L. = 0

Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

3/6/2015 4:33:21 PM

Facility = Callaway Elementary School WWTP

Chemical = TRC (mg/L)

Chronic averaging period = 4

WLAa = 4

WLAc =

Q.L. = 0.1

# samples/mo. = 30

# samples/wk. = 8

#### Summary of Statistics:

# observations = 1

Expected Value = 1000

Variance = 360000

C.V. = 0.6

97th percentile daily values = 2433.41

97th percentile 4 day average = 1663.79

97th percentile 30 day average = 1206.05

# < Q.L. = 0

Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity

Maximum Daily Limit = 4

Average Weekly limit = 2.38602034360889

Average Monthly Limit = 1.98248465547072

The data are:

1000

## **Attachment G**

### **Regional Water Quality Model Output**

REGIONAL MODELING SYSTEM    VERSION 4.0  
**Model Input File for the Discharge  
to BLACKWATER RIVER.**

**Segment Information for Segment 1**

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	CALLAWAY ELEMENTARY SCHOOL WWTP
VPDES Permit No.:	

Discharger Flow Information

Flow:	0.0019 MGD
cBOD5:	30 mg/l
TKN:	20 mg/l
D.O.:	0 mg/l
Temperature:	21.5 Degrees C

Geographic Information

Segment Length:	0.26 miles
Upstream Drainage Area:	22.17 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	1196 Ft.
Downstream Elevation:	1189 Ft.

Hydraulic Information

Segment Width:	15 Ft.
Segment Depth:	0.387 Ft.
Segment Velocity:	0.419 Ft./Sec.
Segment Flow:	1.572 MGD
Incremental Flow:	-1.57 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Moderately Meandering
Pool and Riffle:	Yes
Percent Pools:	50
Percent Riffles:	50
Pool Depth:	0.387 Ft.
Riffle Depth:	0.315 Ft.
Bottom Type:	Small Rock
Sludge:	None
Plants:	None
Algae:	On Entire Bottom

REGIONAL MODELING SYSTEM    VERSION 4.0  
**Model Input File for the Discharge  
to BLACKWATER RIVER.**

**File Information**

File Name: C:\Users\Becky\Documents\VPDES\Calllaway Elementary School WWTP\Ce  
Date Modified: March 07, 2015

**Water Quality Standards Information**

Stream Name: BLACKWATER RIVER  
River Basin: Roanoke River Basin  
Section: 6a  
Class: III - Nontidal Waters (Coastal and Piedmont)  
Special Standards: NEW-1

**Background Flow Information**

Gauge Used: Blackwater River  
Gauge Drainage Area: 22.17 Sq.Mi.  
Gauge 7Q10 Flow: 1.57 MGD  
Headwater Drainage Area: 22.17 Sq.Mi.  
Headwater 7Q10 Flow: 1.57 MGD (Net; includes Withdrawals/Discharges)  
Withdrawal/Discharges: 0 MGD  
Incremental Flow in Segments: 7.081642E-02 MGD/Sq.Mi.

**Background Water Quality**

Background Temperature: 21.5 Degrees C  
Background cBOD5: 2 mg/l  
Background TKN: 0 mg/l  
Background D.O.: 7.630965 mg/l

**Model Segmentation**

Number of Segments: 1  
Model Start Elevation: 1196 ft above MSL  
Model End Elevation: 1189 ft above MSL

modout

"Model Run For C:\Users\Becky\Documents\VPDES\Callaway Elementary School WWTP\Callaway Ele model 2015.mod  
On 3/7/2015 2:21:43 PM"

"Model is for BLACKWATER RIVER."

"Model starts at the CALLAWAY ELEMENTARY SCHOOL WWTP discharge."

"Background Data"

"7Q10", "cBOD5", "TKN", "DO", "Temp"

"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"

1.57, 2, 0, 7.631, 21.5

"Discharge/Tributary Input Data for Segment 1"

"Flow", "cBOD5", "TKN", "DO", "Temp"

"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"

.0019, 30, 20, .0, 21.5

"Hydraulic Information for Segment 1"

"Length", "Width", "Depth", "Velocity"

"(mi)", "(ft)", "(ft)", "(ft/sec)"

.26, 15, .387, .419

"Initial Mix Values for Segment 1"

"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"

"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"

1.5719, 7.622, 5.085, .089, 8.48, 21.5

"Rate Constants for Segment 1. - (All units Per Day)"

"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"

.8, .857, 16.154, 16.739, .35, .393, 0, 0

"Output for Segment 1"

"Segment starts at CALLAWAY ELEMENTARY SCHOOL WWTP"

"Total", "Segm."

"Dist.", "Dist.", "DO", "cBOD", "nBOD"

"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"

0, 0, 7.622, 5.085, .089

.1, .1, 7.632, 5.022, .088

.2, .2, 7.632, 5, .087

.26, .26, 7.632, 5, .087

"END OF FILE"

## **Attachment H**

### **Reduced Monitoring Evaluation Memorandum**

# MEMORANDUM


## DEPARTMENT OF ENVIRONMENTAL QUALITY *Blue Ridge Regional Office*

3019 Peters Creek Road

Roanoke, VA 24019

SUBJECT: Justification for Reduced Monitoring Frequency  
Reissuance of VPDES Permit No. VA0088561  
Callaway Elementary School WWTP

TO: Permit File

FROM: Becky L. France, Water Permit Writer 

DATE: March 8, 2015 (Revised 6/3/15)

### Compliance History

The VPDES Permit Manual recommends effluent monitoring frequencies. Guidance Memo 98-2005 allows for reduced monitoring at facilities with excellent compliance histories. For this reissuance, the eligibility for reduced monitoring has been evaluated.

To qualify for consideration of reduced monitoring, the facility should not have been issued any Letter of Noncompliance (LON), Notice of Violation (NOV), Warning Letter or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. The facility has not received any warning letters or enforcement actions during the past three years, so it qualifies for reduced monitoring.

### Monitoring Data Evaluation

Discharge Monitoring Report (DMR) data for pH, total suspended solids (TSS), biochemical oxygen demand (BOD<sub>5</sub>), and oil and grease from November 2011 through January 2015 were reviewed and tabulated in the attached tables and these parameters have been considered for reduced monitoring. Total residual chlorine limits are not considered eligible for reduced monitoring to ensure protection of aquatic life and human health. The actual performance to permit limit ratios are summarized in the table that follows. Facilities with baseline monitoring that have an actual performance to permit limit ratio of greater than 75 percent are not eligible for reduced monitoring.

Table 1                      **Performance to Permit Limit Ratios (DMR Data)**

Parameter	Actual Performance/ Permit Limit Monthly Average*	Actual Performance/ Permit Limit (Maximum)*	Reduced Monitoring
TSS	15%, 7.98%	9.92%, 4.96%	1/6 Months
BOD <sub>5</sub>	32%, 17%	21%, 11%	1/Quarter
pH			1/ Discharge-Week

\*The ratio based upon concentration is listed first, and the ratio based upon loading is listed second.

pH: The permittee does not add chemicals during the treatment process. So, pH may be considered for reduced monitoring. During the permit term, none of the data were within 0.5 S.U. of the permit limit. So, based on the monitoring data, pH monitoring frequency has been reduced to 1/discharge-week.

TSS: The DMR data are consistently well below the permit limits. According to Guidance Memo 98-2005, facilities with baseline monitoring that have an actual performance to permit limit ratio of less than 25 percent are eligible for a reduced monitoring frequency of 1/6 months. A reduced monitoring frequency of 1/6 months for TSS has been included in the permit.

BOD<sub>5</sub>: In September 2011 there was an exceedance of the BOD<sub>5</sub> limit (73.2 mg/L). The permittee discovered undissolved sodium sulfite from the dechlorination tablets floating in the sample and attributed the high BOD<sub>5</sub> to the oxygen scavenging properties of the sodium sulfite. This problem was not noted in the last three years of the permit term. So, the BOD<sub>5</sub> exceedance in 2011 does not appear to be a concern when evaluating current monitoring data. The DMR data during the last three years are consistently well below the permit limits. According to Guidance Memo 98-2005, facilities with baseline monitoring that have an actual performance to permit limit ratio of between 25 and 49 percent are eligible for a reduced monitoring frequency of 1/3 months. A reduced monitoring frequency of 1/3 months for TSS has been included in the permit.

Oil and Grease: One of the oil and grease data points was over the limit. So, the oil and grease monitoring frequency has not been reduced from the 1/discharge-month in the previous permit.

The permit will contain a special condition that will revert the TSS and BOD<sub>5</sub> monitoring frequencies back to 1/discharge-month and the pH to 1/discharge-day if the permittee should be issued a Warning Letter or be the subject of an active enforcement action.

Table 2 TSS and BOD<sub>5</sub> Effluent Data

Date DMR Due	TSS				BOD <sub>5</sub>			
	average kg/d	max kg/d	average mg/L	max mg/L	average kg/d	max kg/d	average mg/L	max mg/L
10-Dec-11	4	4	1	1	<QL	<QL	<QL	<QL
10-Jan-12	<QL	<QL	<QL	<QL	0.01	0.01	3	3
10-Feb-12	11.4	11.4	2.5	2.5	18.9	18.9	5.4	5.4
10-Mar-12	41.64	41.64	11	11	52.99	52.99	14	14
10-Apr-12	6	6	1.5	1.5	11	11	2.8	2.8
10-May-12	<QL	<QL	<QL	<QL	29.1	29.1	7.7	7.7
10-Jun-12	7.57	7.57	2	2	7.57	7.57	2	2
10-Jul-12	19	19	5	5	37	37	9.8	9.8
10-Aug-12	6.6	6.6	3.5	3.5	11.4	11.4	6	6
10-Sep-12	32	32	8.5	8.5	13	13	3.4	3.4
10-Oct-12	24.2	24.2	6.4	6.4	38.6	38.6	10.2	10.2
10-Nov-12	27	27	7.1	7.1	93	93	24.5	24.5
10-Dec-12	17	17	4.5	4.5	88	88	23.3	23.3
10-Jan-13	6.4	6.4	1.7	1.7	19.7	19.7	5.2	5.2
10-Feb-13	14	14	3.7	3.7	61.3	61.3	16.2	16.2
10-Mar-13	21.2	21.2	5.6	5.6	80.2	80.2	21.2	21.2
10-Apr-13	25.7	25.7	6.8	6.8	28.8	28.8	7.6	7.6
10-May-13	7.2	7.2	1.9	1.9	30.3	30.3	8	8
10-Jun-13	8	8	2.1	2.1	26	26	6.9	6.9
10-Jul-13	8	8	2.1	2.1	11	11	2.9	2.9
10-Sep-13	<QL	<QL	<QL	<QL	38	38	10	10
10-Oct-13	22	22	5.7	5.7	50	50	13.3	13.3
10-Nov-13	34	3	9.1	9.1	61	61	16.1	16.1
10-Dec-13	19	19	5	5	61	61	16	16
10-Jan-14	<QL	<QL	<QL	<QL	<QL	<QL	<QL	<QL
10-Feb-14	34	34	9	9	30	30	8	8
10-Mar-14	34	34	9	9	34	34	9	9
10-Apr-14	23	23	6	6	42	42	11	11
10-May-14	34	34	9	9	19	19	5	5
10-Jun-14	45	45	12	12	38	38	10	10
10-Sep-14	15	15	4	4	30	30	8	8
10-Oct-14	11	11	3	3	30	30	8	8
10-Nov-14	4	4	1	1	30	30	8	8
10-Dec-14	11	11	3	3	57	57	15	15
10-Jan-15	19	19	5	5	76	76	20	20
10-Feb-15	11	11	3	3	34	34	9	9
mean	17	16	4.5	4.5	36	36	9.6	9.6
maximum	45	45	12	12	93	93	25	25
minimum	<QL	<QL	<QL	<QL	<QL	<QL	<QL	<QL
permit limit	210	320	30	45	210	320	30	45
performance / permit limit) 100	7.98	4.96	15	9.92	17	11	32	21

DMR Data

Date DMR Due	Flow, MGD Monthly Ave.	Flow, MGD Max.	pH, min S.U.	H ion conc	pH, max S.U.	H ion conc
10-Dec-11	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Jan-12	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Feb-12	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Mar-12	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Apr-12	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-May-12	0.001	0.001	6.8	1.585E-07	7.1	7.943E-08
10-Jun-12	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Jul-12	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Aug-12	0.0005	0.0005	7	1.000E-07	7	1.000E-07
10-Sep-12	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Oct-12	0.001	0.001	7	1.000E-07	7.3	5.012E-08
10-Nov-12	0.001	0.001	7	1.000E-07	7.3	5.012E-08
10-Dec-12	0.001	0.001	7	1.000E-07	7.3	5.012E-08
10-Jan-13	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-Feb-13	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-Mar-13	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-Apr-13	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-May-13	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-Jun-13	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-Jul-13	0.0008	0.001	7	1.000E-07	7.2	6.310E-08
10-Sep-13	0.0009	0.001	7	1.000E-07	7.1	7.943E-08
10-Oct-13	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Nov-13	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Dec-13	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Jan-14	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Feb-14	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Mar-14	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Apr-14	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-May-14	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Jun-14	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Sep-14	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Oct-14	0.001	0.001	7	1.000E-07	7.2	6.310E-08
10-Nov-14	0.001	0.001	7	1.000E-07	7.1	7.943E-08
10-Dec-14	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Jan-15	0.001	0.001	7	1.000E-07	7	1.000E-07
10-Feb-15	0.001	0.001	7	1.000E-07	7	1.000E-07
mean	0.0010	0.0010	7.00	9.888E-08	7.12	7.638E-08
maximum	0.0010				7.30	
minimum		0.0005	6.80			
permit limit	0.0019		6.0	1.000E-06	9.00	1.000E-09

Date DMR Due	Oil and Grease
	maximum mg/L
10-Dec-11	<QL
10-Jan-12	<QL
10-Feb-12	<QL
10-Mar-12	<QL
10-Apr-12	<QL
10-May-12	<QL
10-Jun-12	<QL
10-Jul-12	<QL
10-Aug-12	<QL
10-Sep-12	<QL
10-Oct-12	<QL
10-Nov-12	<QL
10-Dec-12	16.8
10-Jan-13	<QL
10-Feb-13	<QL
10-Mar-13	<QL
10-Apr-13	<QL
10-May-13	<QL
10-Jun-13	<QL
10-Jul-13	<QL
10-Sep-13	<QL
10-Oct-13	<QL
10-Nov-13	<QL
10-Dec-13	<QL
10-Jan-14	<QL
10-Feb-14	<QL
10-Mar-14	<QL
10-Apr-14	<QL
10-May-14	<QL
10-Jun-14	<QL
10-Sep-14	<QL
10-Oct-14	<QL
10-Nov-14	<QL
10-Dec-14	<QL
10-Jan-15	<QL
10-Feb-15	<QL
mean	0.5
maximum	16.8
minimum	<QL
permit limit	15

## **Attachment I**

### **Public Notice**

## PUBLIC NOTICE – Environmental Permit

**PURPOSE OF NOTICE:** To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Franklin County.

**PUBLIC COMMENT PERIOD:** May 16, 2015 to June 15, 2015

**PERMIT NAME:** Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board

**APPLICANT NAME, ADDRESS, AND PERMIT NUMBER:** Franklin County Public Schools, 250 School Service Road, Rocky Mount, VA 24151, VA0088561

**FACILITY NAME AND LOCATION:** Callaway Elementary School, 8451 Callaway Road, Callaway, Virginia 24067

**PROJECT DESCRIPTION:** Callaway Elementary School has applied for a reissuance of a permit for the public wastewater treatment plant. The applicant proposes to release treated sewage wastewater at a rate of 1,900 gallons per day from the current facility into a water body. The facility proposes to release the treated sewage into the South Fork of the Blackwater River in the Upper Blackwater Watershed (VAW-L08R). A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: organic matter, solids, toxic pollutants.

**HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING:** DEQ accepts comments and requests for public hearing by e-mail, fax, or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for a public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if a public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

**CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS, AND ADDITIONAL INFORMATION:**

Becky L. France; ADDRESS: Virginia Department of Environmental Quality, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019-2738; (540) 562-6700; E-MAIL ADDRESS: [becky.france@deq.virginia.gov](mailto:becky.france@deq.virginia.gov); FAX: (540) 562-6725. The public may review the draft permit and application at the DEQ office named above by appointment or may request copies of the documents from the contact person listed above.